CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

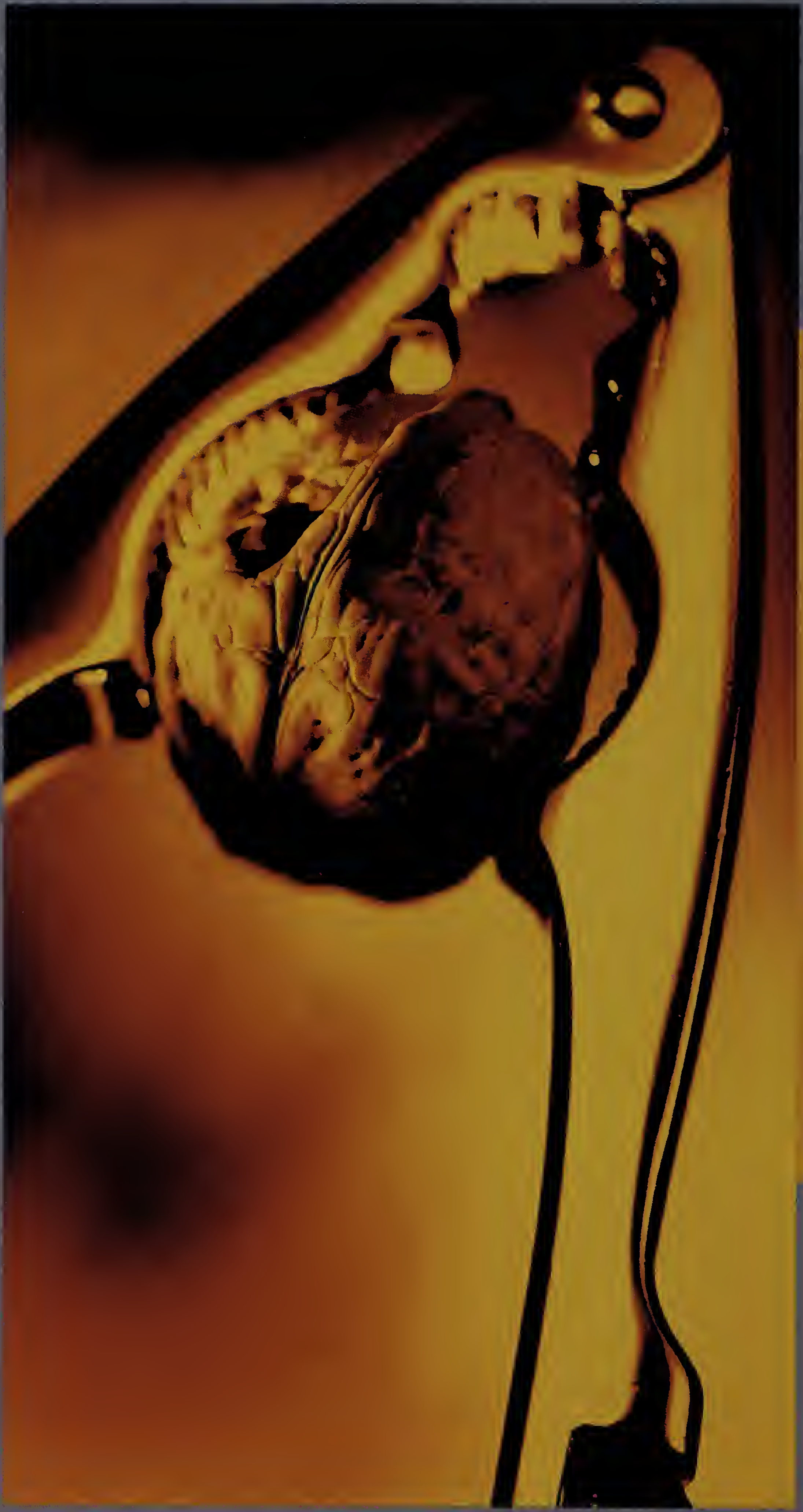
MARCH 1992
VOLUME FIVE NUMBER EIGHT
SEVEN DOLLARS

SPECIAL ISSUE:

Software For The Distributed Era

Amoco Corp.'s
Jackie Ribich

AN INTERNATIONAL DATA GROUP PUBLICATION



If you think that the concept of open systems is destined to be like the paperless office, just another one of the computer industry's unfulfilled dreams, here's something that will put your concerns to rest.

NAS
ANYTH
APPLE

Network Application Support (NAS) from Digital. A comprehensive implementation of standards that integrates applications across a multi-vendor environment.

In terms less polysyllabic, NAS makes it possible fo

NAS FROM DIGITAL

© DIGITAL EQUIPMENT CORPORATION 1991. THE DIGITAL LOGO IS A TRADEMARK OF DIGITAL EQUIPMENT CORPORATION. IBM IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORPORATION. HEWLETT-PACKARD IS A REGISTERED TRADEMARK OF HEWLETT-PACKARD COMPANY.

you to unite many different systems, including those you have as well as those you plan to add in the future. Whether they come from us, IBM®, Hewlett-Packard®, Sun®, Compaq®, Apple® or a host of others.

without the expense of training your end-users to learn new procedures.

It's an accomplishment that gives you the power to use the best solution from whatever company offers it, and integrate it into your existing system.

CAN OPEN
ING. EVEN IBM, SUN,
AND COMPAQ.

With NAS you can run many of your applications across a wide range of operating systems. You can get an application to interoperate with other applications on both local and remote systems. And you can do it

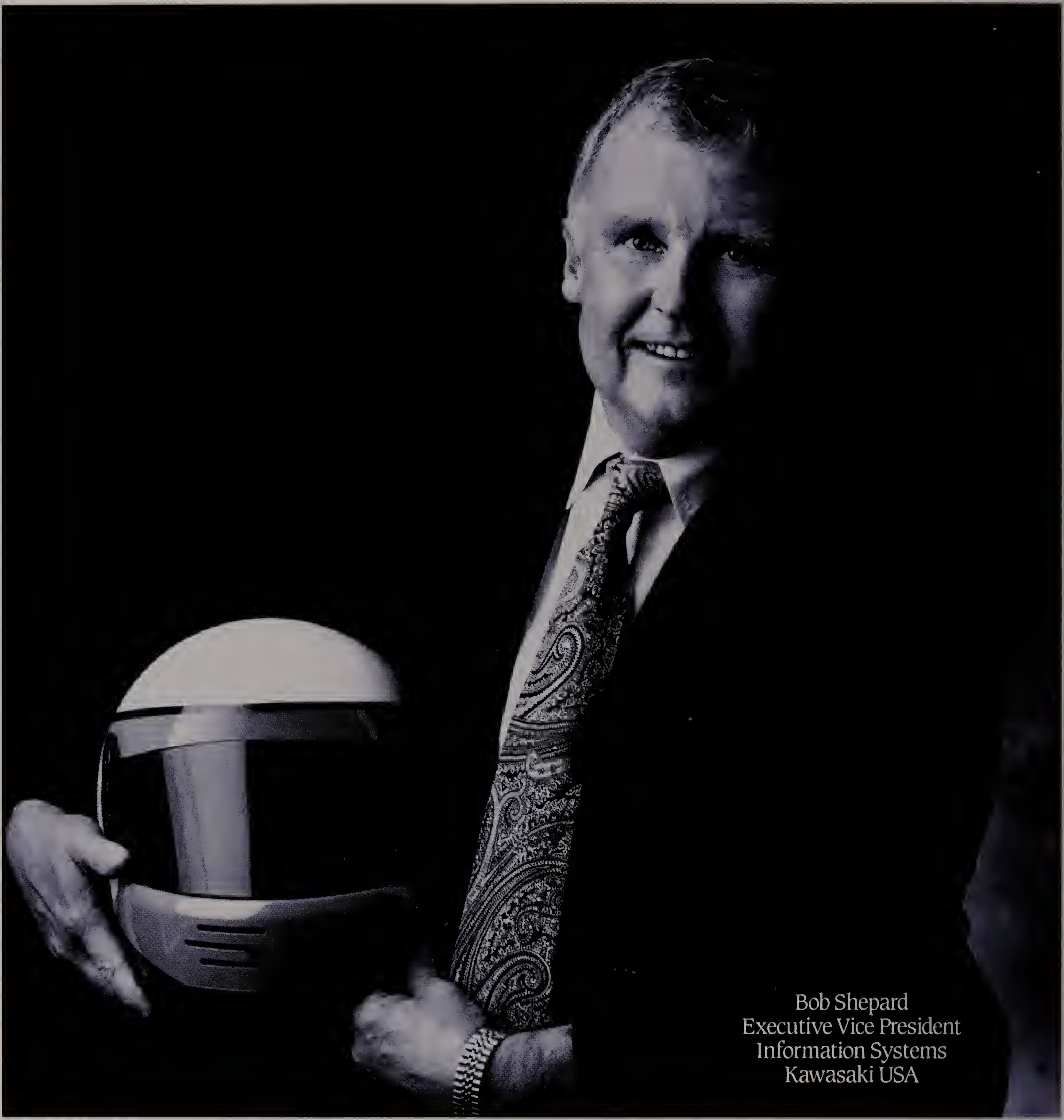
More impressively, it's a feat that empowers your people to work together more effectively, sharing information, resources and networked application packages from whatever desktop device they already use.

So whether you're trying to open an existing system, or want to build a new one from scratch, talk to us. With NAS, we can crack just about any system. Including the only one that really matters. Yours.

digital™

THE OPEN ADVANTAGE.

SUN IS A REGISTERED TRADEMARK OF SUN MICROSYSTEMS, INC. COMPAQ IS A REGISTERED TRADEMARK OF COMPAQ COMPUTER CORPORATION.
APPLE IS A REGISTERED TRADEMARK OF APPLE COMPUTER, INC.



Bob Shepard
Executive Vice President
Information Systems
Kawasaki USA

"I don't lose sleep worrying about my software company going out of business. With CA, I know my software investment is protected by the financial stability and resources of a billion-dollar, Fortune 500 company. That's important. Because in this business, anything can happen."

CA90s
CA's Computing Architecture For The 90s.

Solid as a rock, CA offers uncommon security in the volatile, high-risk world of software. With more than $1.6 billion in sales and a proven, 16-year track record of success, CA offers more than 95% of the Fortune 500 total peace of mind.

And that's one feature all software should offer.

COMPUTER® ASSOCIATES
Software superior by design.

© Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11788-7000. 1-800-CALL CAI. All product names referenced herein are trademarks of their respective companies.

CIO

VOLUME 5, NUMBER 8

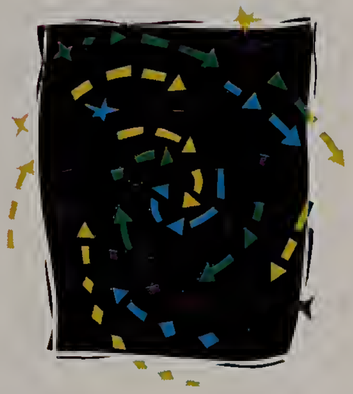
SOFTWARE FOR THE DISTRIBUTED ERA

Special Report begins on Page 37

Progress in the Pipeline 38

With a few confidence-inspiring applications already in place, Amoco's measured approach toward distributed processing is proving that slow and steady wins the race.

By David Freedman



Fueling the move to distributed systems **38** *Cover photo by Neil MacDonald*

How To Be Wary Without Waffling 46

In the unstable and still-evolving distributed environment, CIOs face the need to move forward without moving too far, or too fast, in the wrong direction.

By Meghan O'Leary

A Promising Harvest 56

The days of slim pickings are gone as vendors cultivate a burgeoning crop of distributed-computing tools.

By Richard Pastore

Systems on a Shoestring 66

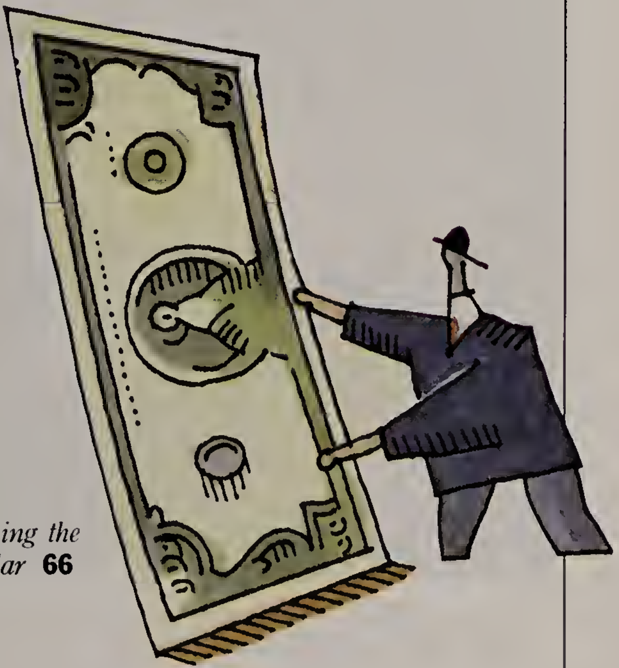
CIOs are devising some creative schemes for getting more mileage out of limited software budgets.

By Thomas Kiely

The Human Factor 74

Building a top-notch staff in the era of distributed computing means rethinking those old human-resource strategies.

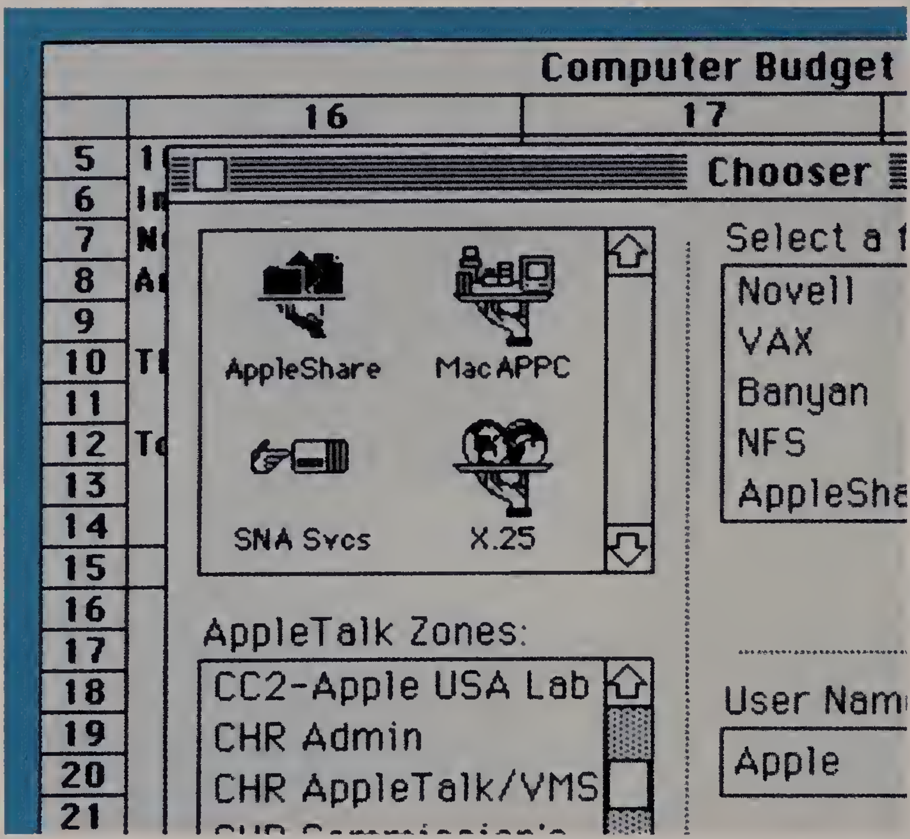
By Kathleen Melymuka



Stretching the IS dollar **66**

MORE ▸▸▸

We're open



Computer Budget

16 17

5 1
6 In
7 N
8 A
9
10 T
11
12 T
13
14
15
16
17
18
19
20
21

Chooser

Select a f

Novell
VAX
Banyan
NFS
AppleSha

AppleTalk Zones:

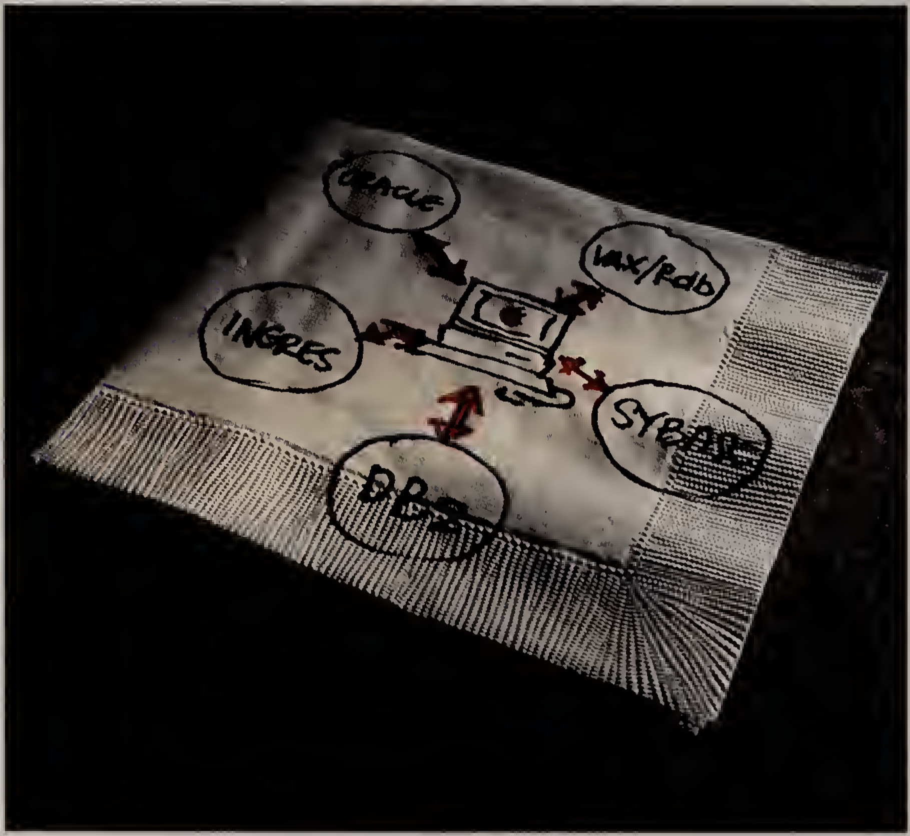
CC2-Apple USA Lab
CHR Admin
CHR AppleTalk/VMS

User Nam

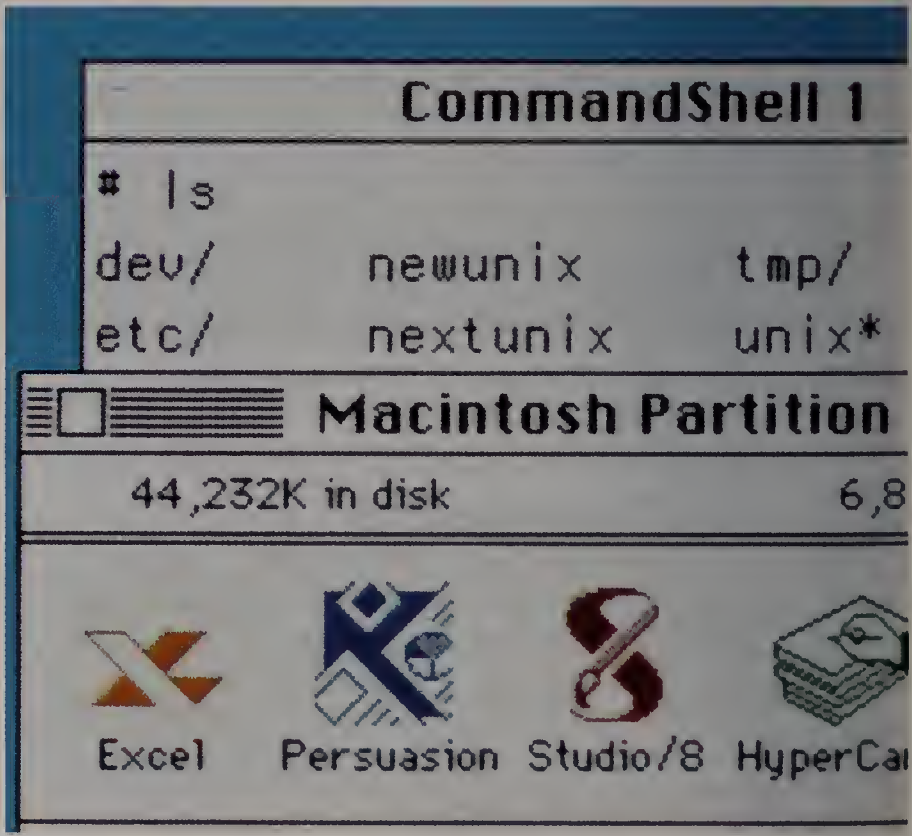
Apple

This is the Macintosh Chooser. A single point of access to a wide range of systems. The Chooser shows available network resources graphically and consistently. Just point the mouse and you're connected.

Macintosh offers an incredible range of tools for connecting with virtually any host-based environment, whether it's running SNA, TCP/IP, DECnet™, or OSI.



Apple's Data Access Language (DAL) adapts popular off-the-shelf database, spreadsheet, and data analysis software to major SQL environments. So nontechnical users can easily access remote databases.



CommandShell 1

```
# ls
dev/        newunix      tmp/
etc/        nextunix     unix*
```

Macintosh Partition

44,232K in disk 6,8

Apple A/UX™ lets Macintosh run UNIX™ applications plus thousands of Mac® programs. At the same time you can run X-Window and MS-DOS applications, and cut, copy, and paste between any of them. No other desktop computer can do this.

to anything.

Macintosh shares data with DOS PCs via Novell, 3Com, Banyan, and more. Macintosh reads and writes DOS files on a floppy disk. Macintosh runs DOS programs. Maybe your next DOS computer should be a Macintosh.

Information isn't much good to people who can't get to it. Macintosh sorts out the complexities of multiple computer systems and presents vast information to people at the desktop in a single, consistent way.

While diversity may make life rich and fascinating, it makes life as an IS manager something short of serene.

What is politely referred to as the "multi-vendor environment" is an amalgam of disparate hardware, incompatible operating systems, dissimilar databases, and multiple networks. Nevertheless, IS people are expected to make these all work together in perfect harmony.

But lately, a lot of people are finding the source of their solution a pleasant surprise: the Apple® Macintosh® computer.

They're finding that Macintosh comes out of the box with sophisticated networking capabilities designed right in.

That Macintosh is open to virtually any host, any file server, or any database, through any network.

That Macintosh makes the desktop the place where diverse systems come together.

And that with Macintosh you can build systems that let even nontechnical users access information from the desktop, no matter where that information resides.

And because Macintosh works with all your networks, databases, and hosts in one consistent and graphic way, it delivers major savings in implementation and training.

In short, Macintosh gives you the power to make information systems more valuable to the people who use them. The power to be your best.®

Macintosh gives people a single, simple view of the information and services that can help them do their jobs and serve your organization. See for yourself. Call 800-635-9550, ext. 500, and we'll send you a free video showing how Macintosh helps unify complex systems.

© 1991 Apple Computer, Inc. Apple, the Apple logo, A/UX, Mac, Macintosh, and "The power to be your best" are registered trademarks of Apple Computer, Inc. UNIX is a registered trademark of AT&T, and MS-DOS is a registered trademark of Microsoft Corporation. DECnet is a trademark of Digital Equipment Corporation, and X-Window System is a trademark of Massachusetts Institute of Technology. One videotape per customer. Offer good only in the U.S. and while supplies last. Allow 4-6 weeks for delivery.

Access

*Re-engineering:
the software solution*

The future is here but the past is still here too.
Client/server, point and click.... You need to support new approaches, but what about the years of effort and tens of millions of dollars tied up in existing mainframe applications?

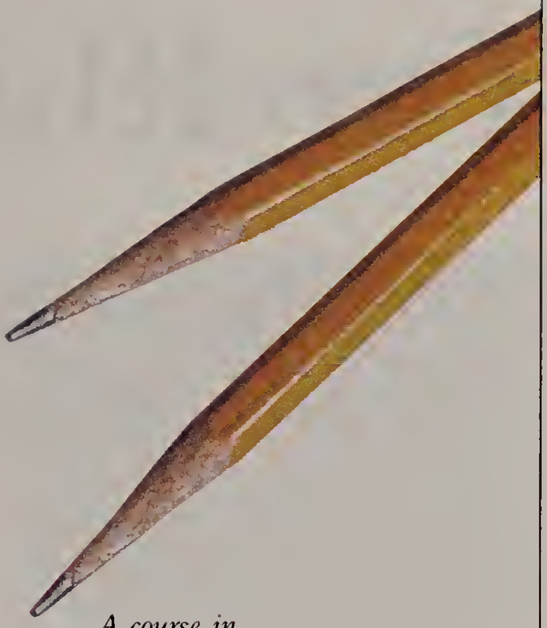
Now you can have the best of both worlds.
With software from Early, Cloud & Company you can access 3270 applications from any terminal or workstation. You can simultaneously access different applications and integrate the information where needed. Access is immediate, and transparent. All without modifying existing applications.

Do more with less. Before you commit to a re-engineering strategy that requires a major hardware investment, consider the software solution.

To learn more about how you can have access,
call 1-800-829-2050 ext. 800.

Early, Cloud & Company™
Aquidneck Industrial Park Newport, Rhode Island 02840

CIO


A course in teaching teachers **82**

COLUMNS

INSIGHTS: THE FORK IN THE PC ROAD 32

With IBM and Microsoft pursuing widely divergent strategies, friction between the two companies has led to a major split on the selection of a future PC operating system to succeed the aging MS-DOS.
By David Passmore

HUMAN FACTORS: INNER RESOURCES 82

Cost-conscious IS organizations looking for effective technology trainers are discovering that there's no place like home.
By Ruth Colvin Clark

STATE OF THE ART: GETTING IT TOGETHER 86

Unlike most technology trends, interoperability is being driven not by vendors but by users who need to reduce costs and increase the value of their products and services.
By Melvyn E. Bergstein, Roderick S. Walker and Timothy McBreen

WORKING SMART: COMPUTER-AIDED CRIME PREVENTION 96

The Minneapolis Police Department is getting extra value from its computer-aided dispatch system by using the details of 911 calls to identify recurring problems and take corrective action before trouble strikes.
By Megan Santosus

Choosing sides in the clash of the titans **32**

DEPARTMENTS

Editor's Letter 10

Publisher's Letter 14

Trendlines 16
►Technostress
►Hacker detectives
►Electronic bookings
►Online home search
►Blue Cross outsourcing
►Vendors via satellite
►Gulf War virus
►Canadian voice processing
►Career moves
►Software sickness

FYI 92

Events/Index 94

Elementary, my dear hacker **16**

The IEF™ works. For Aetna. For Rhône-Poulenc Rorer.

The success of Texas Instruments I-CASE product is proven—in the field.

There is an integrated CASE product that works. It works now...and it works well.

The IEF™, or Information Engineering Facility™, is in use now by successful companies, large and small, all over the world.

Major gains in productivity, quality, and maintainability.

Productivity gains in initial development are hard to measure, but reports of 2-to-1 improvements are fairly common—and some go as high as 5-to-1.

Quality improvements are dramatic. Users are getting more of what they need to run their businesses. Systems get up and running easier and faster.

As for maintenance, a Gartner Group study showed that, even back in 1990, more than 80% of IEF developers were getting gains of from 2-to-1 to 10-to-1.

Now, develop on PC and generate for DEC/VMS, UNIX. TANDEM, WINDOWS available soon.

The IEF has generated applications for IBM mainframe environments (MVS/DB2 under TSO, IMS/DC and CICS) since early 1988. Now you can develop systems in OS/2 and automatically generate for DEC/VMS and some UNIX platforms. TANDEM, Microsoft® WINDOWS, and more UNIX will be available soon.

Developers give IEF highest rating in COMPUTERWORLD.

COMPUTERWORLD magazine's "buyer's scorecard" showed that developers ranked the IEF first among all I-CASE products in the study, particularly in the areas of application quality, programmer productivity, and value for the dollar.

COMPUTERWORLD
BUYERS' SCORECARD

New tutorial provides very fast, friendly IEF training.

We believe our new Rapid Development Tutorial is a breakthrough in CASE training. We gave it the broadest possible beta test—more than 100 companies participated. Developers were able to learn to build systems with the IEF more quickly than ever before—some in as few as five days!

Special "Starter Kit" offer combines new tutorial and full-capability PC toolsets.

The new IEF Starter Kit will give you everything you need to start building systems with I-CASE on your OS/2 PC.

Along with the tutorial, the kit includes our standard OS/2 PC analysis, design and construction toolsets as well as testing and code generation in C. (A COBOL compiler is optional and priced separately.)

There's also 90 days of "hot-line" support.

The kit is priced at $10,000 (limit one per customer company). That's about one-half the regular cost of the toolsets.

If you're not convinced that the IEF can work for you, here's a chance to see for yourself—at a special low price and (with the new tutorial) in a very short time.

To order an IEF Starter Kit, or for more information, call 800-527-3500.

TEXAS INSTRUMENTS

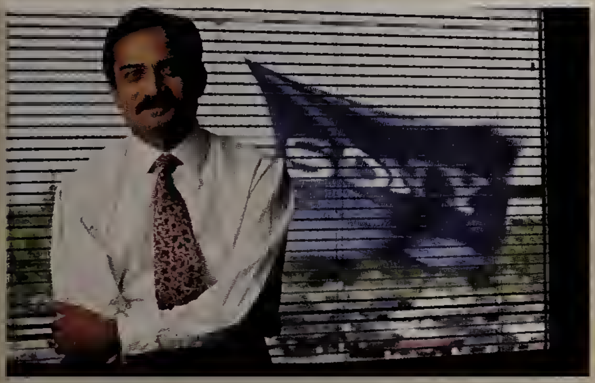
© 1992 TI.
Information Engineering Facility and IEF are trademarks of Texas Instruments.
Other product names listed are the trademarks of the companies indicated.
230015-R

Target. Rolls-Royce. Canadian Airlines. Sony.

"Our first major project was a mission-critical system for our Managed Care operation. Conventional development would have taken 2-3 years...with the IEF, we built the first release in only 13 months. The IEF is now our company CASE standard."
Richard F. Connell
VP, Information Technology
AETNA

"MERLIN is mission-critical—the most far-reaching business systems initiative we've ever undertaken. Over 400 transactions are in production, with 800 more to be added in the next three months. We could not handle this scale and complexity without IE/IEF."
Wal Budzynski
Head of Operations, Systems/Computing
Rolls-Royce Aerospace

"With previous methods, we would have had to compromise on an 'okay' 10-screen Lease Accounting system. With the IEF, our users got everything they wanted—an outstanding 40-screen system—in the same time. They are requesting the IEF for all future systems."
Tom Jeffery
Sr. VP, Information Systems
Target



"The IEF offers dramatic improvements in productivity, yet it's easy to learn. One example: We trained 23 developers, including 18 new hires, and then completed a large order processing system—300 transactions —all in only 20 months."
Venkat (Vinnie) Tiruviluamala
Director, CPC/CPPC Information Systems
SONY Corporation

"We used an IEF frequent flyer template to build our 'Canadian Plus' system. A major redesign, estimated at 4-6 months using previous methods, took less than a month. Now we're providing better customer service, and maintenance costs are greatly reduced."
Bill Palm
President, Canadian Technology Services
Canadian Airlines

"Our new Customer Order Services Marketing Information System—over 500 transactions and 250 entities—is in production. Quality is excellent and our users are very pleased. Dedicated people armed with the IEF advantage have made COSMIS a success."
James R. Engle
Director, Systems and Programming
Rhône-Poulenc Rorer

"Your new IEF tutorial was a way to quickly become familiar with the IEF and see how the IEF will allow quality systems to be built very quickly. I feel I now know how to build systems using the techniques described."
Roger Strand
Application Development Consultant
First Federal Lincoln

"The IEF tutorial is very well done. I feel comfortable with this software and I have acquired the skills to build simple systems. The tutorial is a very fast and effective means of evaluating the capabilities of the IEF."
Margaret Kubaitis
Research Programmer, IS&S
University of Illinois

"The IEF tutorial is put together very well and quickly illustrates how to construct a system using the IEF. It gives one the basics to start getting the job done. I feel I am prepared now to build simple systems using the IEF."
K. E. Peacock
Data Administrator
City of Saskatoon, Saskatchewan

The inevitable move to distributed computing is yet another angst-producing event for information executives. CIOs must devise the architecture for this emerging organizational imperative with the knowledge that distributed computing two years from now will look completely different from what exists today. Building the software systems and applications for this new environment involves using untried tools and revamping IS skills. CIOs must proceed with caution; the ground is squishy and the chances of slogging into a quagmire abound.

This month's special software issue explores the steps CIOs are taking to incorporate distributed computing into their overall architectures. In Senior Writer Meghan O'Leary's article, "How to Be Wary Without Waffling" (Page 46), technology guru Bruce Rogow advocates a bifurcated approach that involves driving down the cost of the current computing platform and investing savings in the transition to the distributed era.

Managing software budgets remains a prime concern: In *CIO*'s poll of nearly 100 readers, respondents revealed a variety of strategies for holding down costs as they make the transition to distributed systems. Senior Writer Thomas Kiely's article, "Systems on a Shoestring" (Page 66), reports that some 90 percent said they are purchasing packaged software, while others are negotiating caps on maintenance fees and driving hard bargains on support and multiple-license fees.

When it comes to tools, homegrown interim solutions remain the order of the day at most companies. But a widening array of packaged development tools is becoming available, as Senior Writer Richard Pastore explains in "A Promising Harvest" (Page 56).

CIOs also face the dilemma of a workforce unversed in the skills required by the distributed era. In "The Human Factor" (Page 74), Contributing Writer Kathleen Melymuka describes the adjustments CIOs must make in the way they hire, train and retrain their employees.

Despite the difficulties, some companies are already reaping the benefits of distributed systems. Amoco Corp., profiled by Contributing Writer David Freedman on Page 38, is a leader in this respect. Amoco's effort has virtually transformed the role of IS from providing centralized services to fostering business-unit autonomy. A massive shift, but one that is needed for the distributed era to proceed.

Marcia Blumenthal

PHOTO BY WEBB CHAPPELL

CIO

© By CIO Publishing Inc

Publisher/Editorial Director	Joseph L. Levy
Editor-In-Chief	Marcia Blumenthal
Managing Editor	Lew McCreary
Art and Design Director	Mary Lester Marshall
Special Projects Editor	Allan E. Alter
Associate Editor	Abbie Lundberg
Associate Editor	Leigh Buchanan
Senior Writer	Thomas Kiely
Senior Writer	Meghan O'Leary
Senior Writer	Richard Pastore
Writer/Researcher	Megan Santosus
Assistant Art Director	Moira Gillis
Design Associate	Kim Morneau
Editorial Assistant	Mina C. Ahn
Director of Marketing	Cathy O'Leary Hayes
Production Director	Lori Beth Sadewitz
Director of Finance & Admin.	Nancy A. Bryson
Assistant to the Publisher	Diane Martin
Circulation Director	Carol A. Spach
Fulfillment Manager	Susan Woodworth
Sales & Marketing Specialist	Bridget Cammarata
Circulation Assistant	Beverly Bigham
Administrative Assistant	Lynn J. Palmquist
VP/GM, Executive Programs	Lynda Rosenthal
Executive Program Manager	Walter Manninen
Marketing Services Manager	Lori Cardarelli

Contributing Writers Melvyn E. Bergstein, Ruth Colvin Clark, David Freedman, Timothy McBreen, Kathleen Melymuka, David Passmore, Roderick S. Walker

Editorial Offices CIO Publishing Inc., 492 Old Connecticut Path, P.O. Box 9208, Framingham, Mass. 01701-9208 (508) 872-8200. **Subscriber Services** (800) 788-4605.

International Data Group

Board Chairman	Patrick J. McGovern
President	Walter Boyd
Executive Vice President	William P. Murphy

CIO is a publication of International Data Group, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. International Data Group publishes over 150 computer publications in more than 50 countries. Thirty million people read one or more International Data Group publications each month. International Data Group's publications include: **ARGENTINA'S** Computerworld Argentina, Infoworld Argentina, **ASIA'S** Computerworld Hong Kong, Computerworld Southeast Asia, Computerworld Malaysia, **AUSTRALIA'S** Computerworld Australia, Australian PC World, Australian Macworld, Profit, Information Decisions, Reseller, **AUSTRIA'S** Computerwelt Oesterreich; **BRAZIL'S** DataNews, PC Mundo, Mundo IBM, Mundo Unix, Automacao & Industria, Publish; **BULGARIA'S** Computerworld Bulgaria; **CANADA'S** ComputerData, Direct Access, Graduate Computerworld; **CHILE'S** Informatica; **COLOMBIA'S** Computerworld Colombia, **CZECHOSLOVAKIA'S** Computerworld Czechoslovakia, PC World Czechoslovakia, Network World, Nueral; **DENMARK'S** CAD/CAM WORLD, Computerworld Danmark, PC World Danmark, Macworld Danmark, Computerworld Focus, Lotus World, Macintosh Produktkatalog, Unix World, PC/LAN World, **EGYPT'S** PC World Middle East, **FINLAND'S** Mikro PC, Tietoviikko, Tietotekniikka, Tietoverkko, **FRANCE'S** Le Monde Informatique, Distributique, Compu Search, Golden, Computer Direct, InfoPC, Telecoms International, Le Guide du Monde Informatique, **GERMANY'S** Computerwoche, Computerwoche Focus, Computerwoche Extra, Computerwoche Karriere, Information Management, Macwelt, Netzwelt, OS/2 Welt, PC Woche, PC Welt, Unix Welt, Unit, Lotus Welt, **GREECE'S** PC World, **HUNGARY'S** Computerworld SZT, Mikrovilag Magazin, PC Vilag, **INDIA'S** Computers & Communications, **ISRAEL'S** People & Computers; **ITALY'S** Computerworld Italia, PC World Italia, Macworld Italia, Network World Italia, **JAPAN'S** Computerworld Japan, Macworld Japan; **KOREA'S** Computerworld Korea, PC World Korea, **MEXICO'S** Computerworld Mexico, PC Journal; **THE NETHERLANDS'** Computerworld Netherlands, LAN Magazine, Mac Magazine, Computer! Totaal, **NEW ZEALAND'S** Computerworld, PC World, **NIGERIA'S** PC World Africa, **NORWAY'S** Computerworld Norge, C World, PC World Norge, PC World Ekspress, IDG Direct Response, Multimedia and Desktop, Lotus World, PC World's Product Guide, Student's DP-Guide, Publish! World, Macworld Norge, **PERU'S** PC World, **PEOPLE'S REPUBLIC OF CHINA'S** China Computerworld, PC World China; IDG HIGH TECH Newproductworld, **PHILIPPINES'** Computerworld, PC World, **POLAND'S** Computerworld Poland, **ROMANIA'S** Infoclub; **RUSSIA'S** CADWorld, Computerworld, Networks, PC World, **SPAIN'S** CIMWorld, Communicaciones World, Computerworld Espana, PC World Espana, Macworld, PC World Autoedicion, Amiga World, Publish; **SWEDEN'S** ComputerSweden, Mikrodatorn, Macworld, CAD/CAM World, Lotus, Windows, Svenska PC World, Lokala Natverk/LAN, Affarsekonomi Management, Attack, CAP, Dataingenjoren, Data & Telekommunikation, Maxi Data, Digital/Varlden, Unix, **SWITZERLAND'S** Computerworld Schweiz, Macworld Schweiz, **TAIWAN'S** Computerworld Taiwan, PC World Taiwan; **THAILAND'S** Thai Computerworld, **TURKEY'S** Computerworld, PC World, **UNITED KINGDOM'S** Lotus, Macworld **UNITED STATES'** Amiga World, CIO, Computerworld Computer Buyers World, Digital News, Electronic News, Federal Computer Week, GamePro, inCider/A+, IDG Books, InfoWorld, Lotus, Macworld, MPC World, NeXTWORLD, Network World, PC Games, PC World, Portable Office, PC Letter, Publish!, Run, SunWorld, **VENEZUELA'S** Computerworld Venezuela, MicroComputerworld Venezuela, **YUGOSLAVIA'S** Moj Mikro

BPA

DEVELOP IT ONCE AND FOR ALL.

These days, it seems that almost everyone has a favorite Graphical User Interface (GUI). And most organizations also have non-graphical user interfaces running on block mode terminals, character mode terminals and PCs. Which usually means that developers must spend months rewriting each application for each incompatible system.

Unless the applications are built with Oracle® Tools.

An application developed with Oracle Tools automatically adapts to the native look and feel of the computer on which it runs. On Sun, IBM, DEC, HP, PCs, Macintosh and virtually any other computer. Even on character and block mode terminals. All without changing a single line of code.

Today, Oracle Tools like SQL*Forms and SQL*Menu work with Microsoft Windows and Presentation Manager. And they fully support Motif, Open Look, Macintosh, block mode and character mode.

So your applications can be deployed across all the computers in your organization. Your users can take full advantage of their GUI without having to be re-trained. And your programmers don't waste time recoding applications for each user interface.

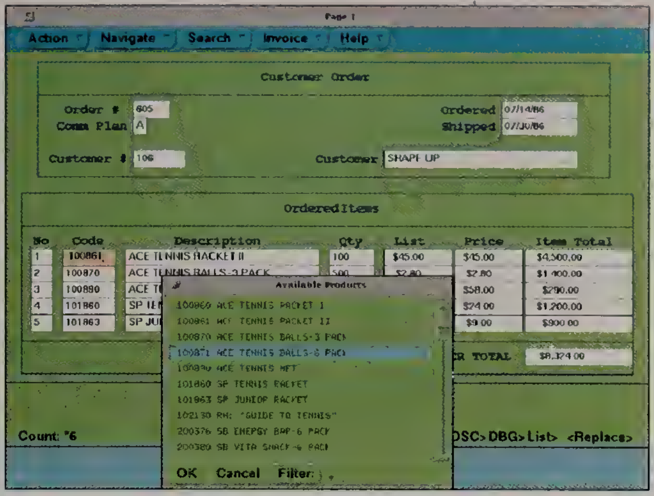
Call us at 1-800-633-1059 Ext. 9656 and you'll receive the free Oracle Tools Information Kit, illustrating the full capabilities of Oracle Tools.

It'll show you how to solve any GUI mess once and for all.

ORACLE®

Software for people who can't predict the future.

©1992 Oracle Corporation. ORACLE, SQL*Forms and SQL*Menu are registered trademarks of Oracle Corporation. Macintosh is a trademark of Apple Computer, Inc. Open Look is a trademark of AT&T. Motif is a trademark of Open Software Foundation, Inc. Presentation Manager is a trademark of IBM, Inc. Windows is a trademark of Microsoft Corporation. All other trade names referenced are the trademark of the respective manufacturer. Call for hardware and software requirements. Outside the U.S.A. but within North America, call 1-800-668-8925 for product, service, and seminar information.



Customer Order

Order # 605
Comm Plan A
Ordered 07/14/86
Shipped 07/30/86
Customer # 106
Customer SHAPE UP

Ordered Items

No	Code	Description	Qty	List	Price	Item Total
1	100861	ACE TENNIS RACKET II	100	$45.00	$45.00	$4,500.00
2	100870	ACE TENNIS BALLS-3 PACK	500	$2.80	$2.80	$1,400.00
3	100890	ACE T			$58.00	$290.00
4	101860	SP TEN			$24.00	$1,200.00
5	101863	SP JU			$9.00	$900.00

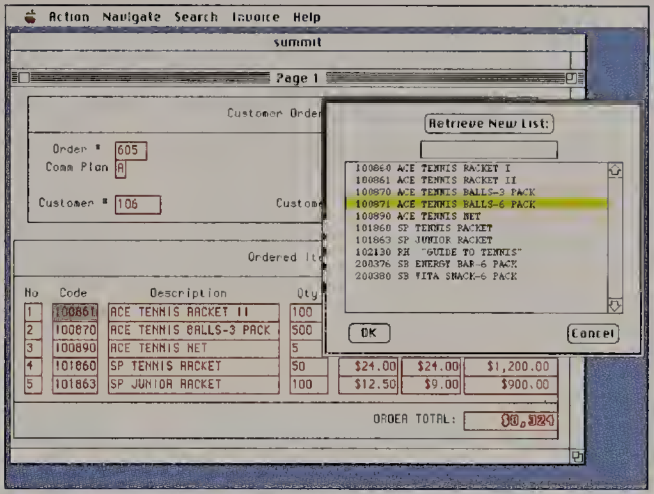
R TOTAL $8,324.00

Available Products

100860 ACE TENNIS RACKET I
100861 ACE TENNIS RACKET II
100870 ACE TENNIS BALLS-3 PACK
100871 ACE TENNIS BALLS-6 PACK
100890 ACE TENNIS NET
101860 SP TENNIS RACKET
101863 SP JUNIOR RACKET
102130 RH: "GUIDE TO TENNIS"
200376 SB ENERGY BAR-6 PACK
200380 SB VITA SNACK-6 PACK

Count: *6
OSC>DBG>List> <Replace>

Open Look



Customer Order

Order # 605
Comm Plan A
Customer # 106

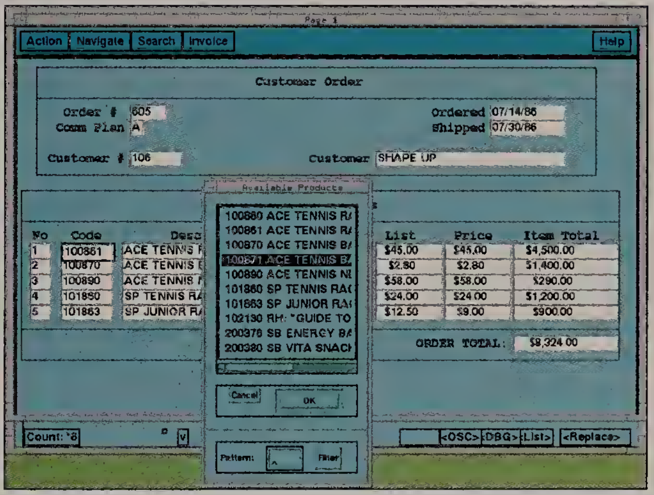
Ordered It

No	Code	Description	Qty			
1	100861	ACE TENNIS RACKET II	100			
2	100870	ACE TENNIS BALLS-3 PACK	500			
3	100890	ACE TENNIS NET	5			
4	101860	SP TENNIS RACKET	50	$24.00	$24.00	$1,200.00
5	101863	SP JUNIOR RACKET	100	$12.50	$9.00	$900.00

ORDER TOTAL: $8,324

100860 ACE TENNIS RACKET I
100861 ACE TENNIS RACKET II
100870 ACE TENNIS BALLS-3 PACK
100871 ACE TENNIS BALLS-6 PACK
100890 ACE TENNIS NET
101860 SP TENNIS RACKET
101863 SP JUNIOR RACKET
102130 RH "GUIDE TO TENNIS"
200376 SB ENERGY BAR-6 PACK
200380 SB VITA SNACK-6 PACK

Macintosh



Customer Order

Order # 605
Comm Plan A
Ordered 07/14/86
Shipped 07/30/86
Customer # 106
Customer SHAPE UP

No	Code	Desc	List	Price	Item Total
1	100861	ACE TENNIS R	$45.00	$45.00	$4,500.00
2	100870	ACE TENNIS E	$2.80	$2.80	$1,400.00
3	100890	ACE TENNIS N	$58.00	$58.00	$290.00
4	101860	SP TENNIS RA	$24.00	$24.00	$1,200.00
5	101863	SP JUNIOR RA	$12.50	$9.00	$900.00

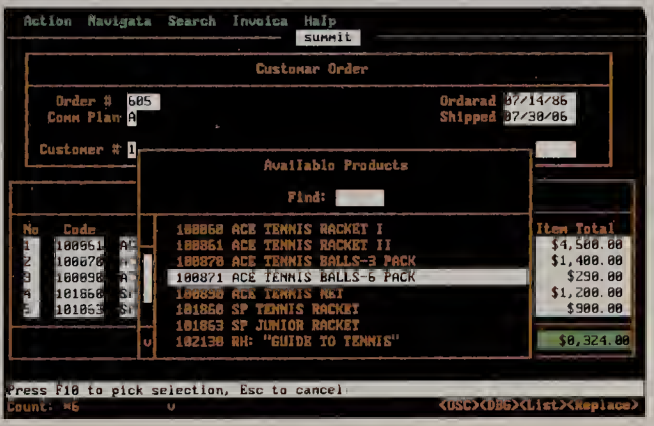
ORDER TOTAL: $8,324.00

Available Products

100860 ACE TENNIS RA
100861 ACE TENNIS RA
100870 ACE TENNIS BA
100871 ACE TENNIS BA
100890 ACE TENNIS NE
101860 SP TENNIS RAC
101863 SP JUNIOR RAC
102130 RH: "GUIDE TO
200376 SB ENERGY BA
200380 SB VITA SNACK

Count: *8
<OSC><DBG><List> <Replace>

Motif



Customar Order

Order # 605
Comm Plan A
Ordarad 07/14/86
Shipped 07/30/86
Customer # 1

Availablo Products

Find:

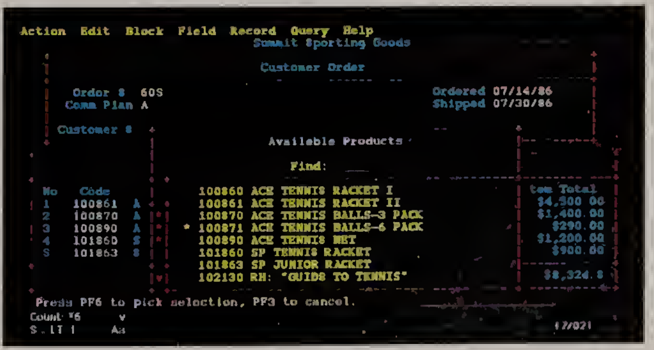
100860 ACE TENNIS RACKET I
100861 ACE TENNIS RACKET II
100870 ACE TENNIS BALLS-3 PACK
100871 ACE TENNIS BALLS-6 PACK
100890 ACE TENNIS NET
101860 SP TENNIS RACKET
101863 SP JUNIOR RACKET
102130 RH: "GUIDE TO TENNIS"

No	Code	Item Total
1	100861	$4,500.00
2	100870	$1,400.00
3	100890	$290.00
4	101860	$1,200.00
5	101863	$900.00

$8,324.00

Press F10 to pick selection, Esc to cancel
Count: *6
<OSC><DBG><List><Replace>

Character Mode



Summit Sporting Goods

Customer Order

Order # 605
Comm Plan A
Ordered 07/14/86
Shipped 07/30/86
Customer #

Available Products

Find:

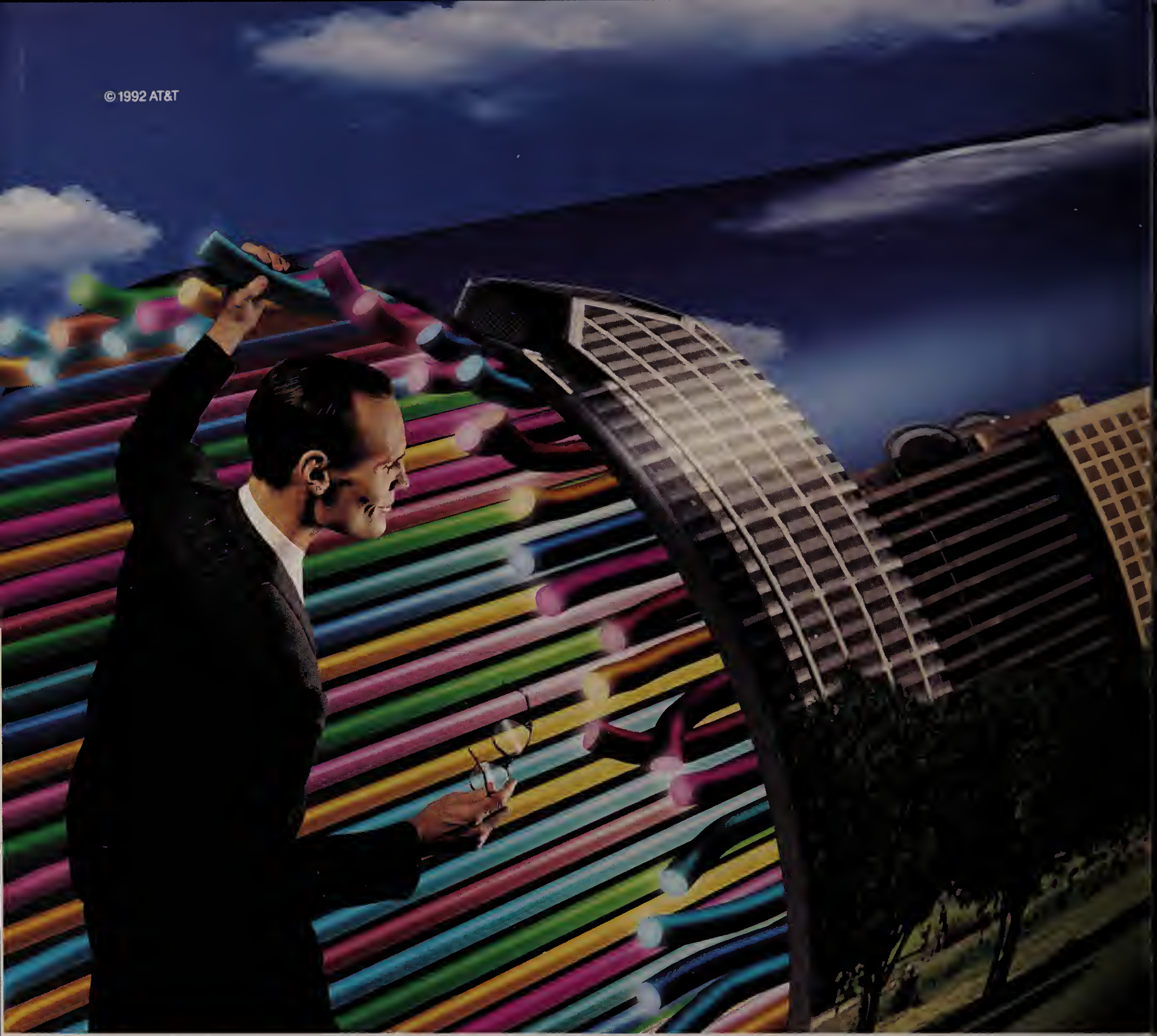
100860 ACE TENNIS RACKET I
100861 ACE TENNIS RACKET II
100870 ACE TENNIS BALLS-3 PACK
100871 ACE TENNIS BALLS-6 PACK
100890 ACE TENNIS NET
101860 SP TENNIS RACKET
101863 SP JUNIOR RACKET
102130 RH: "GUIDE TO TENNIS"

No	Code		tem Total
1	100861	A	$4,500.00
2	100870	A	$1,400.00
3	100890	A	$290.00
4	101860	S	$1,200.00
5	101863	S	$900.00

$8,324.0

Press PF6 to pick selection, PF3 to cancel.
Count *6

Block Mode



© 1992 AT&T

ACCUNET® Information Manager gives yo

If you thought that only your carrier could do network monitoring, think again, because we developed the ACCUNET Information Manager, AIM, to help you monitor every inch of your network, anytime you want.

To do this, AIM uses the Extended Superframe Format to organize data and report circuit performance end-to-end, without taking a single circuit out of service. And AIM's color graphic display makes network monitoring easier. Color codes show you any changes in performance that require action.

In addition, AIM automatically prints out alarm text on your PC printer as well as giving an audible alarm, both onsite, and at an AT&T ACCUNET work center. If you need hard copy of all of your circuit data, you can download this information to your hard disk to produce customized reports. Meanwhile, you'll get specific circuit data on your PC, including circuit number, alarm type, time of alarm, and direction of the fault. You'll also see whether the fault is on your access or IOC circuits and clearly see what section of the network is at fault. This means AIM gives you an early warning of degrading circuits before they affect your network performance.

Plus there's configuration monitoring. As ACCUNET T1.5 circuits are added to your network, the AIM database administrator reflects these changes in real time and shows them graphically on your PC.

Now through April 30, 1992, get AIM and we'll waive t

an insider's view of your entire network.

And now, there's even Ticket Manager, which allows you to open, close and track trouble tickets electronically, thereby eliminating status phone calls.

So for the T1.5 network information manager that gives you more control and is designed with your productivity in mind, get AIM, the ultimate insider's view to your network.

Digital Solutions To Match Your Needs.
Another AT&T Advantage.

For more information, call your AT&T Account Executive or 1 800 247-1212, ext. 611.

AT&T
The right choice.

rst three months' recurring charges, if you qualify.

As companies move to take advantage of the benefits of distributed processing and client/server computing, a dramatic change is taking place in the role of IS.

As demonstrated by large, decentralized organizations like Amoco, profiled in this issue of *CIO*, the role of IS is shifting from developing applications to delivering advice, guidance and training to individual operating units. The obstacle CIOs face is that they don't always have the full complement of in-house expertise needed to succeed in this counseling role.

Accordingly, CIOs are now beginning to view vendor relationships in an entirely different way, primarily because vendors have the expertise needed to succeed in the distributed world. While IT vendors might once have been viewed simply as suppliers, today they are regarded as "business partners" who can provide a lot more than just technology.

The distributed era has created a need on the part of CIOs—for external expertise, training and other services—and a tremendous *opportunity* for IT vendors, whom I believe are in the best position to deliver that expertise and to help the CIO succeed.

P.S. I'm looking forward to joining Peter Drucker and our other prestigious speakers as well as our constituents March 8-11 for our semiannual CIO Perspectives Conference, "The Business of IT: Finding the Payoff." For those of you who are unable to join us, the conference highlights will be reported in the April 15 issue of *CIO*. Our next conference, "The Process of IT: Organizing for Success," will be held Oct. 11-14 in Boca Raton, Fla. For information, call our toll-free hot line: 800 366-0246.

PHOTO BY GEORGE SIMIAN

Coming In CIO

The Image of Change

Using sophisticated image workflow tools, companies are automating document logging, routing, auditing, monitoring and sign-off procedures. In turn, these process changes are transforming parts of the corporate structure and bringing major productivity gains.

Bond-Trader Bonding

It is no longer possible to compete without investing heavily in IT, but who says that companies have to out-muscle one another in developing strategic platforms? Six Wall Street firms have found that when it comes to IT, working hand-in-hand with the opposition can be highly competitive.

New Measures

In a growing number of companies, the traditional, strictly financial assessment of performance is being expanded to include such measures as customer satisfaction, business-process competency and the ability to change and learn.

Team Manufacturing

Manufacturers have learned that reorganizing along team lines is a critical success factor. Can IT make teamwork work better? The answer so far is a qualified yes, but manufacturers are just beginning to learn how.

THIS YEAR IN MVS, DEEP POCKETS ARE OUT.

CMF® MONITOR. THE HIGH-PERFORMANCE, LOW-COST ALTERNATIVE TO RMF.

These days, consuming your budgets with inefficient expenses is hardly fashionable. Which makes CMF MONITOR from Boole & Babbage very much in style.

As opposed to the endless expense and annual increases of RMF,™ with CMF MONITOR you'll have control of your bottom line – and have it looking better than it has in years. Not to mention the great way CMF MONITOR's cost savings and high-performance will look on you.

And CMF MONITOR gives you power features simply not available with RMF. Like CSA usage by job, extended TSO reporting, high-resolution graphics, and more.

Call (03)-820-3811 today. Ask for Chris Parker and find out how CMF MONITOR will give your data centre a great new look.

When it comes to efficiently monitoring MVS, it's a great way to dress for success.

Boole & Babbage

CMF MONITOR is a registered trademark of Boole & Babbage, Inc. RMF and MVS are trademarks of International Business Machines Corporation.

TRENDLINES

TECHNOSTRESS

Dealing With Terminal Illness

After a long day of staring at your computer, do you feel so dazed and exhausted that the only after-hours activity you can handle is catatonically propping yourself in front of the TV?

Have you been using E-mail so much that the thought of talking to someone face-to-face gives you the willies?

Do you feel compelled to lug around a laptop or cellular phone wherever you go?

If these symptoms sound familiar, you may be among the growing number of people suffering from technostress.

According to a recent article in *The Boston Globe*, technologies such as PCs, fax machines and voice mail, which are supposed to simplify modern living, are in fact making our lives and jobs more stressful. The problem, say some psychologists, is that such technology accelerates the pace of work, causing people to work harder and longer. As portable technology blurs the line between home and office, leisure time dwindles and stress levels rise further.

E-mail and voice mail have also strained the ability of some people to relate to each other. One psychologist told of an office where employees located in the same room stopped talking in favor of communicating electronically. As a result, personal social interaction had practically been eliminated.

Craig Brod, a psychologist from Oakland, Calif., has studied adaptive problems experienced by people using new technologies and has written a book about technostress. He believes that technology is not only changing the way people work and relate to each other; it's also affecting their perception of time and their attention spans. "Our expectation of time is changing," Brod said. "We're becoming a nanosecond culture."

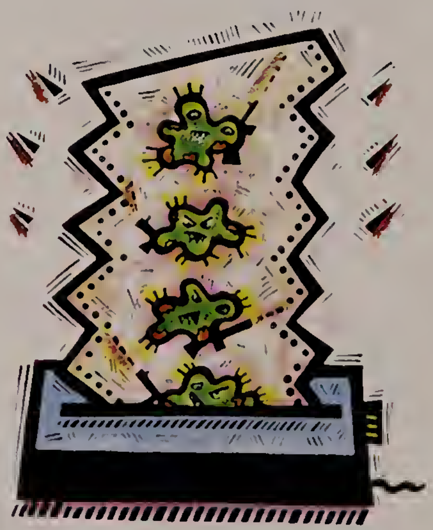
Brod suggests a number of ways to relieve technostress: take frequent breaks (Brod recommends a computer break every 20 minutes), avoid substituting computers for face-to-face communication, and spend some free time doing nontechnical activities.

And of course, leave that laptop at work. ▬

Germ Warfare

So what if the Patriot missiles and smart bombs weren't quite as successful as Gulf War briefers first boasted? They probably didn't need to be. According to a book on the war prepared by reporters for *US News and World Report*, a computer virus introduced into the Iraqi air-defense computer system may have contributed to the relative impunity with which U.S. bombers dumped massive amounts of armament on Iraq.

Excerpts from the book that appeared in a January issue of *US News* say that a virus prepared by the National Security Agency (known popularly as "the puzzle palace" because it is charged with both cracking and creating intelligence codes) made its way into Iraqi computers from a virus installed in a French-made printer. Apparently, U.S. intelligence agents intercepted the printer as it was being smuggled from Amman, Jordan, to Baghdad. The agents replaced an original microchip with a virus-contaminated chip.



According to the *US News* excerpt, the virus caused information to vanish from computer screens as soon as it was called. The virus reportedly escaped detection by Iraqi computer-security measures because it resided not in the system itself but in a printer.

Apparently the era of computer-borne germ warfare is upon us. Hackers, rejoice! Uncle Sam wants you! ▬

EDS Welcomes the Blues

How does Blue Cross and Blue Shield of Massachusetts spell relief? EDS.

In January, the health-insurance provider outsourced its data center, communications network and most application support and development to EDS. It is a plum for the Dallas-based firm—the 10-year, $800 million contract is the company's second largest outsourcing deal (excluding its work for parent company General Motors Corp.), and both companies call it the first outsourcing deal of its kind in the health-care industry. Savings for Blue Cross/Blue Shield could total over $25 million in the first year.

A new office of the CIO will be headed jointly by EDS Manager Pete Carroll and Blue Cross/Blue Shield Manager Bob Hollinger. About 600 former BC/BS IS employees now draw an EDS paycheck—but their future with EDS will be reviewed this month. Another 100 IS employees will remain with BC/BS, some going directly into the business operations.

The Massachusetts insurer has long had its IS woes: A $100 million update to its aged systems was over budget and mismatched to the business. But the company says its decision to outsource was also strategic. Blue Cross/Blue Shield is dramatically reshaping its attack on the health-care market and will need flexible systems and new technologies, delivered fast. A traditional in-house IS organization couldn't support those needs, the company believed. ▬

ILLUSTRATION ABOVE BY JAMES KACZMAN BELOW BY FRAN O'NEILL

I want to see for myself!

☐ Have someone call me right away.

Your Title: (check only one)

GENERAL & CORPORATE:

☐ President/Owner/Director/Chairman/Partner/Vice President/General Manager

COMPANY MANAGEMENT:

☐ **Management:** Vice President EDP/MIS, Director/Manager/Head/Chief of EDP/MIS, Director or Manager of Programming, Director or Manager of Systems and Procedures, Director or Manager of Communications, Director or Manager of EDP Operations

☐ **Marketing:** Vice President Sales/Sales Manager, Director of Manager Marketing

COMPUTER/SYSTEMS OPERATIONS:

☐ **Staff:** Systems Programmer, DBA, Analyst/Systems Analyst, Programmer, Machine or Computer Operator, Software Designer, EDP Auditor

☐ **Supervisory:** Supervisor Equipment/Analysis, Chief/Lead/Senior Programmer, Chief/Lead/Senior Systems Analyst

☐ **CONSULTANT**

☐ **EDUCATOR**

☐ **STUDENT**

☐ **OTHER** ____________________

Operating System(s): (check all that apply)

☐ MVS
☐ PC
☐ VM/XA
☐ DOS/VSE
☐ UNIX
☐ VMS

Hardware ____________________

Name ____________________

Title ____________________

Company ____________________

Address ____________________

____

City ____________________

State/ZIP ____________________

Phone ____________________

Fax ____________________

Need Immediate Information?
Call 1-800-843-9534, ext. 700

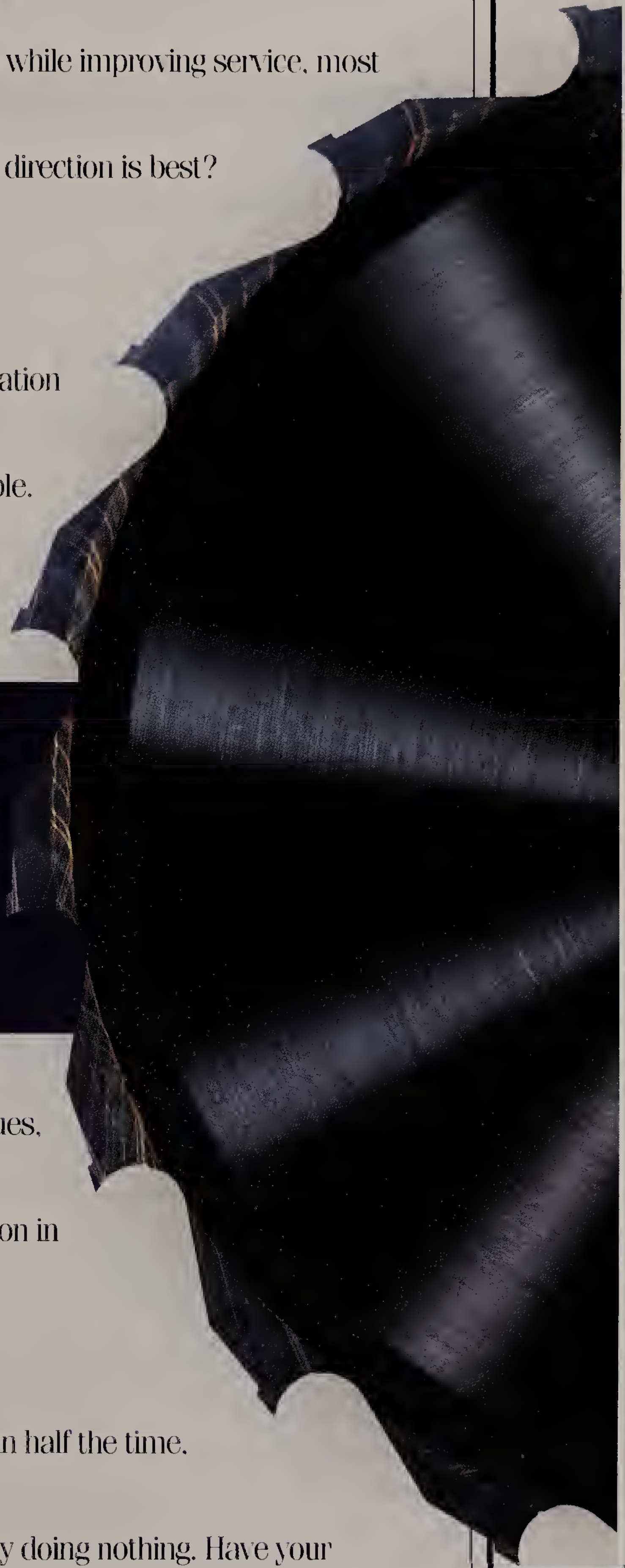
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 2637 CLEARWATER, FL

POSTAGE WILL BE PAID BY ADDRESSEE

SOFTWARE AG of North America, Inc.
Executive Center
Suite 236
25400 US 19 North
Clearwater, FL 34623-9891



With a global economy, rising competition and pressures to cut costs while improving service, most CEOs are asking tough questions: "How can we compete? What strategic direction is best? And am I getting my money's worth for all my IS expenditures?"

You have the right to demand proven results and ROI for your information dollars. But without the right tools, doing more with less may be impossible.

SOFTWARE AG has an offer for you:

Does your IS organization have what it needs to cut applications development time in half?

SOFTWARE AG guarantees to save you time and money.

Using our software development environment and advanced techniques, we'll work with your staff to cut the time it takes to develop your application in half, or it costs you nothing!

Most important, there's no risk. If we can't deliver a working system in half the time, simply return the tools at no cost. Your alternative is to risk a great deal by doing nothing. Have your IS managers call today!

Don't believe us? Call **1-800-843-9534**, ext. 700 and see for yourself!

software AG
SOLUTIONS WORLDWIDE

GUARANTEED

© 1992 SOFTWARE AG of North America, Inc. Referenced products are registered trademarks or trademarks of their respective manufacturers.

TRENDLINES

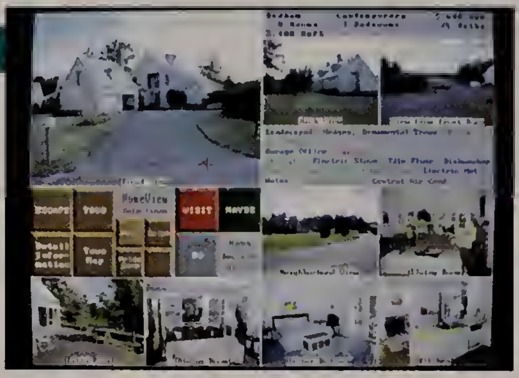
ONLINE REAL ESTATE

THE HOME-SHOPPING NETWORK

Bob Norton knows an opportunity when he sees one. Frustrated by the time-consuming process of shopping for a home, he decided to put his years of IT experience to work on a hi-tech alternative. In January he opened his first computer-based realty search center, and he is convinced that house hunting will never be the same.

According to the National Association of Realtors, the typical buyer spends five months looking for a home. The search usually involves scanning the real-estate pages and wasting a lot of time visiting inappropriate properties because traditional listings are rarely comprehensive or accurate.

HomeView Realty Search Services aims to solve this problem by providing buyers with comprehensive information up front. Buyers visiting a HomeView office use a high-resolution, touch-screen monitor to view multiple, full-color photos of the interior and exterior of each property. In addition, HomeView provides pictures of the immediate neighborhood and attractions of the town.



ROOM WITH A VIEW: *Prospective buyers take an electronic tour of properties.*

The system's proprietary software runs on powerful workstations capable of storing millions of database pictures. With the help of a consultant, buyers select criteria including price range, style of home, number of bedrooms and location based on population, school system and taxes. From a menu, the buyer prioritizes features such as skylights and water views. HomeView uses artificial intelligence to select all the homes in its database that fit the criteria. The buyer can "tour" any of the homes room-by-room by touching the screen.

If a buyer wants a real tour, appointments with brokers are arranged by touching "visit" on the screen. Following a consultation, a color catalog of selected homes is created. When a buyer is ready to make an offer, HomeView provides comparisons with recently sold homes in the neighborhood. The company also offers financial consulting.

Services are free for buyers and sellers; HomeView derives its revenues from a share of broker commissions. Currently, one center serving the Boston metropolitan area operates out of corporate headquarters in Needham, Mass., with expansion plans for 20 additional centers nationwide in the works. And Norton hopes franchises will soon bring HomeView to a real-estate market near you.

Unfortunately for Norton, HomeView arrived too late. After months of futile searching a few years ago, he ended up building a place. ■

A MOVABLE PRESS CONFERENCE

Most journalists get invited to vendor events that they can't attend for reasons of logistics. Apparently aware of this dilemma, Redgate Communications has offered to hook up 100 of "the most important industry influencers" to a nationwide network that will provide satellite broadcasts of all sorts of vendor-related activities. Now it's possible to cover a plethora of industry happenings without leaving the office. If we can't go to the press conference, the press conference can come to us!

The equipment for this enterprise, dubbed the Industry News Network, is free (participating vendors pay access fees). All that's required is a four-foot-diameter rooftop antenna, several hundred feet of coaxial cable running to a conference room, and a multimedia workstation with TV, VCR and fax. Once the network is installed nationwide, journalists will have instantaneous access to such honchos as IBM, DEC, Apple, Microsoft, et al. Not only can we enjoy timely faxes and live-action video, but we can participate interactively via the voice network.

We have nothing against videoconferencing as a technology, but we think this concept goes a little too far. The last thing we need is to turn into a sack of couch potatoes. ■

A SOFTWARE STONING

While the rest of us have spent the winter holed up with flu, some software suppliers have been suffering the ill effects of a more pernicious bug: a computer virus called "Stoned III."

***The New York Times* reported in December that Novell, the nation's largest supplier of network software, had sent a letter to nearly 4,000 customers warning that a reference disk shipped earlier had been accidentally infected. On Dec. 6, software game-maker Konami sent out a missive informing customers that its "Spacewrecked" product had been invaded by an early version of the same virus.**

Novell officials were able to determine when the software was first infected—during a particular part of the manufacturing process—but not how. "Stoned III" attaches itself to a specific area on a diskette and then copies itself into the computer's memory in order to infect other diskettes. ("Stoned III" got its name from an early version of the virus, which carried the message, "Your computer has been stoned. Legalize marijuana.")

Although no damage was reported, a virus expert interviewed by the *Times* said the virus on the Novell diskette was capable of disabling the computers it infected. "If this was to get into an organization and spread to 1,500 to 2,000 machines, you are looking at millions of dollars of clean-up costs," said John McAfee, president of the consulting firm McAfee & Associates, of Santa Clara, Calif. ■

PHOTO COURTESY OF HOME REALTY SEARCH SERVICE, ILLUSTRATION BY FRAN O'NEILL

EIS II:

THE FIRST ENTERPRISE-WIDE SOLUTION.

Open systems, client-server computing and workgroups. These are the new definitions for enterprise-wide corporate computing. And EIS II is the software solution:

- **Integrated applications.** Departmental solutions for sales, marketing and finance support rapid prototyping, applications distribution and bottom-line results.
- **Easy-to-use power.** EIS simplicity through an easy-to-use GUI coupled with true data-driven analytical power for executives, managers and analysts.
- **One unified architecture.** Client-server versatility open to major hardware platforms and operating systems - on stand-alone PC, LAN, mini or mainframe.
- **The bottom line.** Better information enterprise-wide, the tools to use it more profitably and lower support costs. That's why EIS II is the fastest-growing corporate computing solution.

Call **1-800-765-7227** for a free EIS II Information Kit (**416-221-2100** in Canada).

information resources inc

SOFTWARE PRODUCTS GROUP

©1992 Information Resources,Inc., Software Products Group, 200 Fifth Avenue, Waltham, MA 02154

TRENDLINES

ELECTRONIC BOOKINGS

WINDOWS ON THE WORLD

Need to fly to New York or Paris? Don't bother phoning an agent: Just pop open the electronic-mail window on your PC and type in your request. It's no harder than using a bank's ATM—and you can do it anytime, regardless of office hours. That is, if your company books its travel with Rosenbluth Inc., the $1.3 billion Philadelphia-based agency that is rolling out the system this quarter. An innovator in reservation- and customer-service systems since the mid-'80s, Rosenbluth hopes E-Res will keep its competitive edge keen into the mid-'90s.

Reportedly the first service of its kind, E-Res offers corporate customers greater and more flexible access to Rosenbluth for routine reservations. It will also cut down on agents' telephone time and may eventually liberate them from routine bookings. That would free Rosenbluth to redeploy staff and handle peak periods without adding to payroll.

The system will work with any customer E-mail package; a commercial E-mail translation package will take care of any necessary translation between the customer's and Rosenbluth's systems. Reservation requests and agent acknowledgements and confirmations will travel over X.400 lines, with a promised turnaround time of 90 minutes or less. Electronically originated bookings will pass through the same automated error-checking and low-fare-screening gauntlet that phone-in requests endure.

Although the idea first surfaced two years ago, E-Res is the pet project of new CIO and Vice President Sandra Carpenter, who came to the firm last May from Hilton Hotels Corp. Currently, the system requires a human agent to book the reservation. But if the service proves to be a hit, Rosenbluth will develop applications to completely automate the booking procedure, Carpenter said.

Rosenbluth and its systems will be the subject of an upcoming *CIO* profile. ■

CAREER MOVES

BRUCE J. GOODMAN has been named CIO of the Metropolitan Life Insurance Co. of New York. Goodman was previously a vice president in the company's small-business-products department. He succeeds DANIEL CAVANAGH, named president of the company's Metropolitan Property & Casualty subsidiary. Cavanagh was interviewed for last month's "Working Smart" column on MetLife's sales-support system.

RONALD EDELSTEIN has joined Witco Corp., a New York-based worldwide manufacturer of specialty chemicals and petroleum products, as general manager of information systems. Edelstein was previously involved in systems development at Revlon, Mars and American Cyanamid.

JOSEPH T. BROPHY, president of the Travelers Insurance Co. and of the Travelers Managed Care, Employee Benefits and International Operations, and BERNARD TRESNOWSKI, president and CEO of the Blue Cross and Blue Shield Association, were named to cochair a Department of Health and Human Services special workgroup studying ways to improve health-insurance administration through electronic claims processing. ■

COMPUTER SLEUTHING

NOT-SO-PRIVATE EYES

The telltale cigarette ash. A footprint in the mud. Such physical clues were the stock in trade of old-school detectives in search of fleeing felons or vanished heiresses. But today's missing person leaves a different kind of trail, and some modern gumshoes are employing hackers in order to follow it.

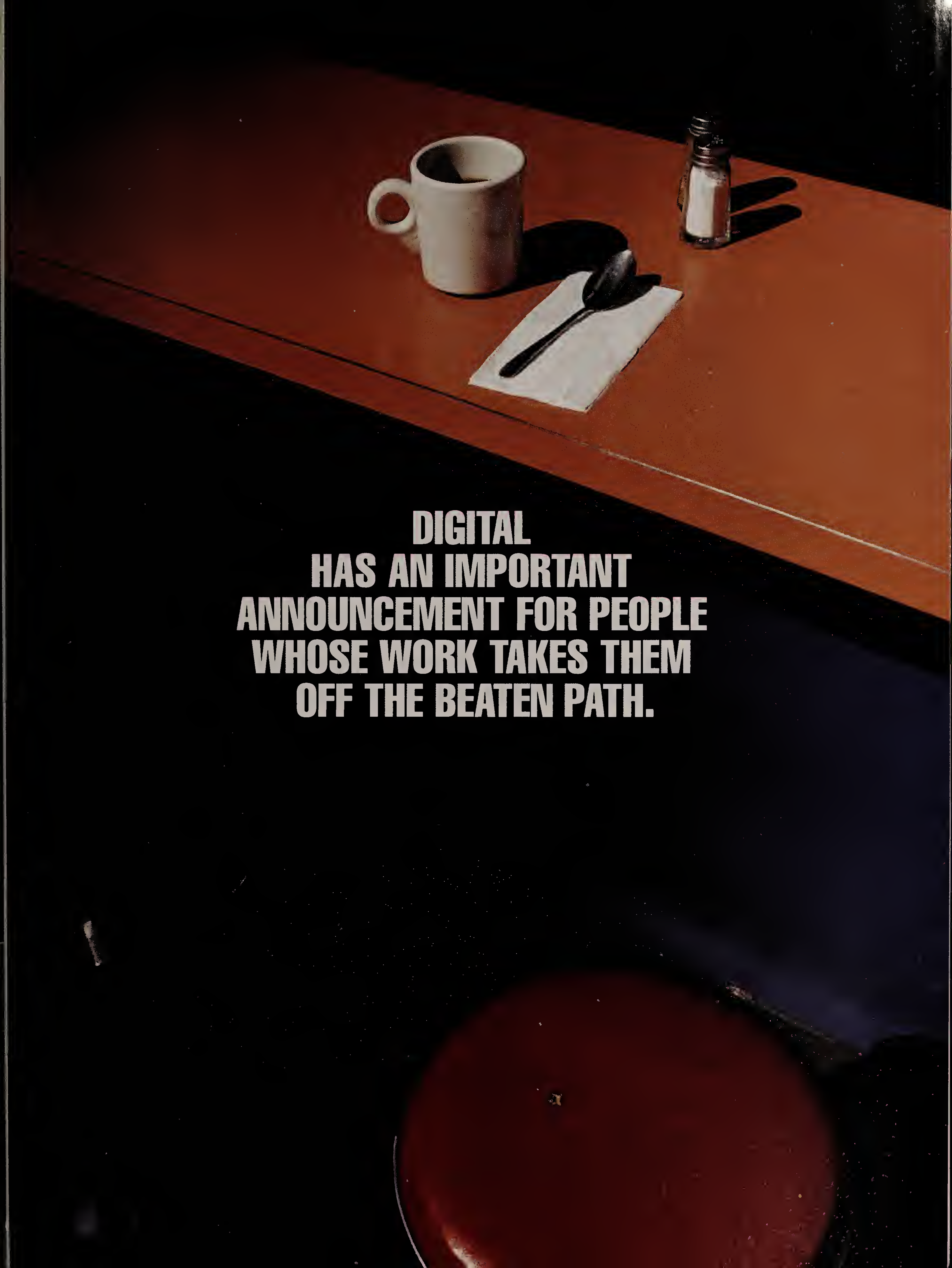
This is, after all, an age when family history matters less than credit history, and people are identified by social security number rather than by name. Apply for a job, have the electricity turned on in a new home, even use a bank ATM and you leave a trail of personal information in innumerable government and corporate databases. Recognizing the value of such data to private investigators, a number of computer-proficient individuals are making a business out of tapping into that supply line.

Until recently, for example, Seattle private eye Jerry Yager received three or four brochures a month from what he calls "investigation support services," firms that offer "hard-to-obtain" information culled from a variety of public- and private-sector databases. Yager uses the services to track down missing persons, particularly noncustodial parents who are on the run after kidnapping a child. "If a person isn't trying to hide, then it's relatively easy to find them," said Yager. "But if they don't want to be found, then you need a little help."

For a relatively modest fee, these services will access information from the phone company, motor-vehicle registries, the Social Security Administration, utilities or any other organization that might hold a clue to the missing person's current address. Some of this data is in the public domain; much of it is not. The services themselves do not advertise the details of their operations, and Yager does not ask. "I don't know, and I don't want to know," he said.

Yager admits that the dubious methods employed by such firms raise ethical questions, and using their services is not always his first choice. "But if it involves a child that's been kidnapped and I can track him, then I'm not concerned how I do that." ■

ILLUSTRATION BY JAMES KACZMAN


DIGITAL
HAS AN IMPORTANT
ANNOUNCEMENT FOR PEOPLE
WHOSE WORK TAKES THEM
OFF THE BEATEN PATH.

WE'LL BE THERE WHEN YOU GET THERE.

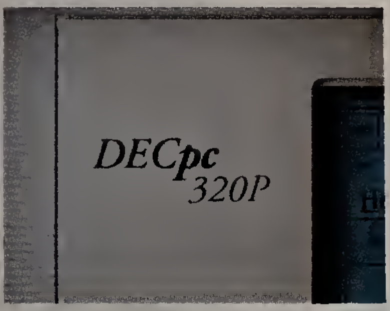
Desktop Direct from Digital™

With Desktop Direct from Digital, you're never alone on the road. A support team of 10,000 stands behind every i386™-based, 20MHz DECpc™ 320P Notebook Personal Computer. Wherever you are, we're just a free phone call away.

So whether you need help running Windows™ in a Wisconsin coffee shop or advice on connecting a modem in a midtown Manhattan hotel, give us a call. If we can't solve your problem over the telephone, we'll send you a repaired system—even on the road—within 48 hours. Even in the unlikely event that your disk drive goes down in Des Plaines or your keyboard comes loose in Kalamazoo.

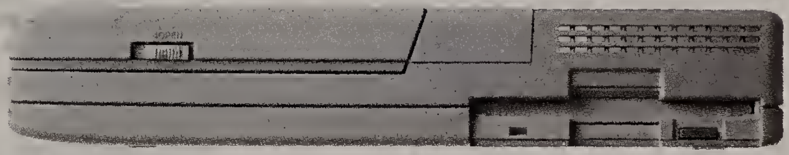
Think of it as travel insurance for your notebook computer.

Wherever you go, you won't miss any connections with the DECpc 320P Notebook. That's because the 320P comes *standard* with a 2400 baud modem so you won't get behind in answering your MCI Mail®–or get cut off from your company database.



And at $1,995 the DECpc 320P Notebook is *priced* to go. Fast.

We put it all on the table. The 20MHz DECpc 320P Notebook Personal Computer is the most comfortable to use on the market today, while the components inside are the hottest. We started with the Intel™ 386sx™ processor and the built-in 2400 baud modem (optional data/FAX modem). Because we don't believe you should have to sacrifice power for portability.



Next, we made the standard 2MB memory expandable to 8MB–plenty of room for running multiple Windows applications. For extra oomph in spreadsheet recalcs, we made room for an optional 80387sx™ Math Coprocessor. Then we added a 40MB (optional 80MB) hard drive and a 3.5″ Floppy diskette drive for ample storage–with DOS™ 5.0 and Windows 3.0 pre-installed. We topped off the chassis with the Triple Super Twist (TST) Backlit VGA display–that puts Windows on-screen without an aggravating blur. We built an AC adapter to weigh less than a pound–so it's easy to carry around–*and* we added the Logitech™ TrackMan® Portable, for FREE.

We even included a three-hour plus battery life to keep you up and running even when you're away from it all.

So call Desktop Direct, before you go, anywhere.

DESKTOP DIRECT from DIGITAL

Taking PCs into the world ahead

Call Desktop Direct at

1-800 PC BY DEC (1-800-722-9332)

Please reference AJD when you call.

8:30 am to 8:00 pm (ET) Mon.-Fri.

digital™

OPEN *For Business*

From our Notebooks to our PCs, we've got you covered. All PCs are the same–until something goes wrong. But when you dial 1-800-722-9332 to place your order, you're online to expertise in PC hardware and software, spreadsheets, MS-DOS® applications, Microsoft Windows–and that's just for starters. You can always turn to Digital's Desktop Services for consultation on systems design and interconnecting your PC networks with host systems. And, by the way, on-site service is absolutely free for one year from the time of purchase.* So whether you're building a few PCs "a la carte" or planning a major corporate purchase, Desktop Direct from Digital has the products and services to create a business solution for you.

Why should service be proprietary when PCs aren't? As PC "clone-makers" come and go and technology proliferates, there's an ever-growing need for a company that can become a single resource for service and support. That's why our Multivendor Support includes all the key players: Apple®. Compaq®. AST™. Dell®. Those aren't "competitors'" PCs. Because you're our customer, they're *your* PCs.

That's the Digital difference.

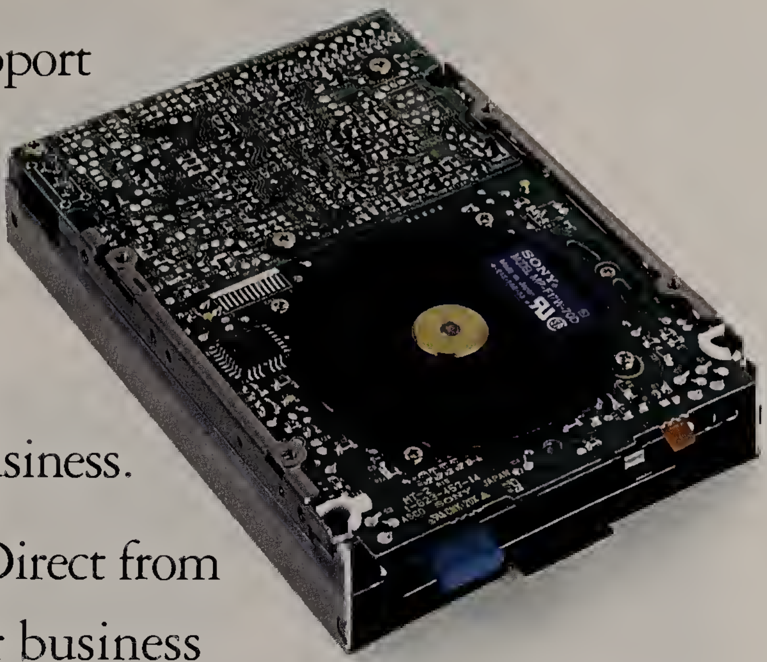
Desktop Direct from Digital is more than a source of high-performance, low-cost PCs. It's a pipeline into an

---

Notebook computers include one-year return to Digital factory warranty.

unparalleled range of service and support honed over decades of meeting the needs, the demands and the "unusual requests" of big business everywhere.

And that's good news for *your* business.



You choose. We build. At Desktop Direct from Digital, we don't try to make your business fit our system. We're committed to PC customization: What you want is what you get, ready to run. Memory. Hard drives. Monitors. Co-processors. Your combination is our command.

Of course, we put together some attractive PC packages–at eye-popping prices. Based on our research, we're sure that these systems meet a variety of office and technical computing needs. But don't hesitate to order "a la carte." That's why we're in this business.

DESKTOP DIRECT 48 HOUR TURNAROUND

Signed, sealed and delivered. When you call 1-800-722-9332, you can be assured that a system is on its way to you within 48 hours. And, if you want, it can be preconfigured with the operating system you need to get up and running: MS-DOS , OS/2® V1.21 and Microsoft Windows. Because time is, after all, money.

DESKTOP DIRECT from DIGITAL
Taking PCs into the world ahead

1-800 PC BY DEC (1-800-722-9332)
Please reference AJD when you call.

digital™

LEADER OF

The **DEC**pc 320P Notebook

Includes:

Microprocessor:	Intel i386sx running at 20MHz
Memory:	2MB
Storage:	40MB IDE Hard Disk Drive 3.5″ 1.44MB Floppy
Display:	TST Backlit VGA
Modem:	2400 bps Data
Keyboard:	84-key Keyboard
Mouse:	Logitech TrackMan Portable
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0 (factory installed)

(Carrying case included)

Special Package Price **$1,995** NEW LOW PRICE
FR-PCP11-AA

The **DEC**pc 316sx

Includes:

Microprocessor:	Intel i386sx running at 16MHz
Memory:	1MB, 80ns Memory Kit
Storage:	52MB IDE Hard Disk Drive 3.5″ 1.44MB Floppy
Resolution Mode:	1024 X 768 SVGA Adapter
Display:	14″ Multi-sync VGA Color Monitor
Keyboard:	101-key Keyboard
Mouse:	Three-button Mouse
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$1,749** NEW LOW PRICE
DJ-PC444-05

The **DEC**station 325c

Includes:

Microprocessor:	Intel i386 running at 25MHz
Memory:	4MB, 80ns Memory Kit
Storage:	52MB IDE Hard Disk Drive 3.5″ 1.44MB Floppy 1.2″ dd Floppy
Resolution Mode:	1024 X 768 SVGA Adapter
Display:	14″ VGA Color Monitor
Keyboard:	101-key Keyboard
Mouse:	Three-button Mouse
Operating Systems:	MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$2,179** NEW LOW PRICE
DJ-PC462-04

THE PACKS.

The **DEC**pc 320P Notebook

Includes:
Microprocessor: Intel i386sx running at 20MHz
Memory: 2MB
Storage: 80MB IDE Hard Disk Drive
3.5″ 1.44MB Floppy
Display: TST Backlit VGA
Modem: 2400 bps Data
Keyboard: 84-key Keyboard
Mouse: Logitech TrackMan Portable
Operating Systems: MS-DOS 5.0 and MS-Windows 3.0 (factory installed)

(Carrying case included)

Special Package Price **$2,495**
FR-PCP11-FA

The **DEC**station™ 320sx

Includes:
Microprocessor: Intel i386sx running at 20MHz
Memory: 1MB, 80ns Memory Kit
Storage: 52MB IDE Hard Disk Drive
Resolution Mode: 1024 X 768 SVGA Adapter
Display: 14″ Multi-sync VGA Color Monitor
Keyboard: 101-key Keyboard
Mouse: Three-button Mouse
Operating Systems: MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$1,849** NEW LOW PRICE
DJ-PC443-05

The **DEC**pc 433 Workstation

Includes:
Microprocessor: Intel i486 running at 33MHz
Memory: 8MB, 70ns Memory Kit
Storage: 40MB IDE Hard Disk Drive
3.5″ 1.44MB Floppy
Resolution Mode: 1280 X 1024 TIGA Adapter
Display: 20″ Color Monitor
Keyboard: 101-key Keyboard
Mouse: Three-button Mouse
Operating Systems: MS-DOS 5.0 and MS-Windows 3.0

Special Package Price **$4,999** NEW LOW PRICE
Offer Good Thru 3/31/92
DJ-PCW10-02

DESKTOP DIRECT from DIGITAL

Taking PCs into the world ahead

1-800 PC BY DEC (1-800-722-9332)

Please reference AJD when you call.

DECpc 320P NOTEBOOK PERSONAL COMPUTER

Announcing the DECpc 320P Notebook – as affordable as it is portable.

DECpc 320P Notebook. Feature packed and affordably priced, this new portable is definitely going places! Our *new* DECpc 320P Notebook Personal Computer – one of the slimmest, sleekest notebooks available today – delivers a high function, fully equipped package for less than what some of our competitors are asking for a *basic* model!

With an Intel 386sx 20MHz processor, 3.5″ 1.44MB floppy drive, 2MB RAM (exp. to 8MB) *and* your choice of 40MB or 80MB IDE hard drive, the DECpc 320P lets you run some of today's most demanding DOS and Windows applications on the plane, at sales meetings – literally *anywhere* your job takes you.

And, with a 2400 baud internal modem *standard* and support for three popular LAN operating systems, the 320P makes it easy to enter orders from remote locations, send updates to your staff, receive home/office memos and *more*.

But that's just part of what puts the 320P out front in the field. It *also* boasts a number of advanced functions, including time- and battery-saving RESUME* (which lets you turn the Notebook off while running a program and return to the same point in the program without reloading); supports an optional *math coprocessor* which speeds calculations and graphics; and offers a host of other *standard features*, including customer installed Q&A® Plus Diagnostic software and pre-installed MS-DOS 5.0 and Windows 3.0; high resolution (640 x 480) VGA LCD display; 84-key keyboard with a numeric keypad built right in; serial/parallel keyboard and VGA ports; rugged all-weather carrying case; AC Adapter and rechargeable Battery Pack; *and* for one full year we guarantee that your Notebook will be repaired and on its way back to you in 48 hours or less!

Free Logitech TrackMan Portable. $120 value included with your Notebook.

DECpc 320P Notebook Personal Computer. Features and Specifications.

Processor:	i386sx
Clock:	20MHz
Memory:	2MB (Exp 8MB)
Expansion Slots:	1 proprietary data modem (or FAX modem)
Storage:	40MB or 80MB IDE Hard Drive 3.5″ 1.44MB Floppy Drive
Display:	VGA LCD Triple Super Twist Backlit
Power:	Removable/Rechargeable NiCad Battery Pack AC Adapter 104-264V
Battery Life:	3+ Hours
Input Devices:	84-key Keyboard w/numeric Keypad built in Logitech Trackman Portable Optional External full size 101-key Keyboard
Ports:	Serial/Parallel, Keyboard, VGA
Operating System Supported:	MS-DOS 5.0
GUI:	Windows 3.0
Resolution Mode:	640 x 480
Modem:	2400 baud or 9600 baud data/FAX Modem
Dimensions:	12.2″L x 10″W x 1.7″H
Weight:	6.4 lbs.
Networks:	PATHWORKS™ Novell NetWare™ Banyan Vines®
Environmental:	Operating Temp. 40°F-100°F

*Not applicable to all applications.

Call for details on available options from data/FAX Modems to extra batteries, etc.

To order or get additional information, call 1-800-722-9332.

For electronic ordering, dial 1-800-234-1998 at 1200-9600 baud, from 7 am to midnight (ET).

TO ORDER, CALL US

1•800 722 9332

1•800 PC BY DEC

8:30AM-8:00PM MON-FRI ET

FAX 1•800 524 5694 MODEM 1•800 234 1998

Always included: Technical Support Line, Helpline, 24 Hour FAX Support.

DECpc 420sx. Information and Specifications

DECpc 420sx: Recommended Start-Up Configuration (Details below.)

DECpc 420sx. Advanced technology, design and features facilitate fast, efficient performance – and help you maximize software applications.

The new DECpc 420sx was created to meet the demand for high performance and functionality in an *affordably-priced* personal computer. It combines advanced technology with enhanced design *and* a wide array of valuable standard features to help you get the most out of today's sophisticated applications.

Housed in a space-saving low-profile system box, the 420sx features Intel's high performance 486sx 20MHz processor, support for up to 32MB directly addressable memory, VLSI® Technology's state-of-the-art "TOPCAT®" chipset – which offers the latest in high integration and flexible configuration features – and cutting edge non-interlaced video technology for 1024 X 768, 256 color graphics.

Other *standard* features include an 8KB integrated cache for further performance enhancements, 512KB VRAM (optional 1MB-VRAM), IDE interface, MS-DOS 5.0, Windows 3.0, 3 PC/AT® expansion slots and a 3-button mouse.

Importantly, all 420sx components – including the CPU and memory – are installed on the main logic board (MLB), which enhances system performance *without* increasing system cost. The 420sx is suitable for use both as a standalone *and* a network client, and is both PATHWORKS and Novell NetWare Certified.

DECpc 420sx. System Configurations

(DECpc 420sx with 8KB Cache, 512KB VRAM, SVGA Adapter, 3.5" Floppy, IDE Controller, DOS 5.0, Windows 3.0, Mouse, Keyboard)*

	VGA Monochrome		**VGA Multi-sync Color**		**16" VGA Color***	
	4MB	8MB	4MB	8MB	4MB	8MB
52MB	$2,299 (DJ-PC445-01)	$2,649 (DJ-PC445-02)	$2,599 (DJ-PC445-03)	$2,949 (DJ-PC445-04)	$3,149 (DJ-PC445-05)	$3,499 (DJ-PC445-06)
105MB	$2,499 (DJ-PC445-07)	$2,849 (DJ-PC445-08)	$2,799 (DJ-PC445-09)	$3,149 (DJ-PC445-10)	$3,349 (DJ-PC445-11)	$3,699 (DJ-PC445-12)

Always included: Technical Support Line, Helpline, One-Year On-Site Service, FAX Support.

**Systems with 16" VGA Color Plus monitor include 1MB VRAM.*

DESKTOP DIRECT from DIGITAL

Taking PCs into the world ahead

OPEN For Business

DECpc 420sx. Recommended Start-Up Configuration

- DECpc 420sx Base System Unit
  (features 4MB memory, 8KB cache, 512KB VRAM, SVGA Adapter, 3.5" floppy, IDE Controller, Mouse, Keyboard)
- MS-DOS 5.0 with Windows 3.0
- 52MB IDE Hard Disk Drive
- VGA Multi-sync Color Monitor

Order No: DJ-PC445-03 Price: $2,599

Express Specs and Options, over,...

digital™

1-800 PC BY DEC (1-800-722-9332)

Please reference AJD when you call.

DECpc 420sx

EXPRESS OPTIONS

OPTION/ACCESSORY	ORDER No.	PRICE
BASE SYSTEM		
DECpc 420sx, 1.44MB 3.5″ Floppy, 4MB memory, SVGA +, IDE Controller, Mouse, Keyboard Ports, Serial/Parallel Ports	FR-PC445-AA	$1,450
OPERATING SYSTEM		
MS-DOS 5.0 and Windows 3.0	QB-MESAA-TA	$160
MS-DOS V3.3 and QEMM 5.1	FR-PC4XQ-AA	$85
MS-DOS V4.0 and QEMM 5.1	FR-PC4XQ-BA	$100
OS/2 V1.21 with Presentation Manager™	FR-PC4XQ-CA	$250
MEMORY		
512KB SIMM (Two 256KB 80ns)	FR-PC4XM-CA	$60
2MB SIMM (Two 1MB 80ns)	FR-PC4XM-CB	$175
8MB SIMM (Two 4MB 70ns)	FR-PCXAM-DC	$650
STORAGE DEVICES		
3.5″ 1.44MB Floppy Disk	FR-PC4XR-FA	$100
5.25″ 1.2MB Floppy Disk	FR-PC4XR-EA	$100
5.25″ 360KB Floppy Disk	FR-PC4XR-GA	$100
3.5″ 52MB IDE Hard Disk Drive	FR-PC4XR-BD	$400
3.5″ 105MB IDE Hard Disk Drive	FR-PC4XR-EB	$600
3.5″ 120MB IDE Hard Disk Drive	FR-PC4XR-DB	$650
3.5″ 209MB SCSI Hard Disk Drive	FR-PCXAR-AA	$900
3.5″ 426MB SCSI Hard Disk Drive	FR-PCXAR-AB	$1,500
5.25″ 60MB Tape Drive (DOS Only)	FR-PC4XT-CA	$265
SCSI ADAPTER (IF A SCSI DRIVE IS SELECTED)		
SCSI Adapter Board with External Connector	FR-PC4XR-CC	$250
COMMUNICATIONS OPTIONS		
Additional Parallel/Serial Port Adapter	FR-PC4XD-AA	$60
Dual Serial Port Adapter	FR-PC4XD-AB	$90
Internal 2400 BPS Modem	FR-PC4XD-CA	$100
VIDEO MONITORS		
14″ Monochrome Monitor	FR-PC4XV-A2	$200
14″ VGA Color Monitor	FR-PCXCV-B2	$400
14″ Multi-sync Color Monitor	FR-PC4XV-B2	$500
16″ Color Monitor 72Hz	FR-VRC16-CA	$1,000
VIDEO ADAPTER MEMORY UPGRADE		
512KB Video RAM Upgrade Kit (1024 x 768)	FR-PCXAM-AA	$60
KEYBOARDS		
101-key Industry Standard	FR-PCXAL-AA	$75
Digital Gold-Key Style	FR-LK250-PA	$100
ACCESSORIES		
3-Button Mouse	FR-PCXAS-AA	$35
REFERENCE		
Technical Reference Guide for 420sx	FR-PC44Y-EE	$70
Multi Language Users Guide for 420sx	FR-PC44Y-CF	$20

Processor:	i486sx
Clock:	20 MHz
Memory:	4MB expandable to 32MB (8KB integrated cache)
Bus Type:	AT
Expansion Slots:	3 PC/AT
Storage Bays:	2 available Front Bays (3.5″, 5.2″)
Storage (Disk):	3.5″ 1.44MB Floppy Drive, 52MB, 105MB, 120MB IDE 3.5″ 209MB, 426MB SCSI 3.5″ (Tape) 60MB Floppy (DOS Only)
Display VGA Monitor:	VGA Color VGA Multi-sync Color (1024 x 768) 16″ color (1024 x 768)
Power:	100 Watts
Mouse:	3-Button Logitech
Operating Systems Supported:	MS-DOS 5.0 OS/2 1.21
GUI:	Windows 3.0 Presentation Manager (All Future Releases)
Resolution Mode:	1024 x 768
Network:	PATHWORKS Certified Novell NetWare Certified
Dimensions:	4.25″H x 15″W x 15.5″D
Environmental Operating:	120V, FCC Class B, Temp. 50°F to 95°F

To order or get additional information, call 1-800-722-9332.

*For electronic ordering, dial **1-800-234-1998** at 1200-9600 baud, from 7am to midnight (ET).*

TO ORDER, CALL US

1•800 722 9332

1•800 PC BY DEC

8:30AM-8:00PM MON-FRI ET

FAX 1•800 524 5694 MODEM 1•800 234 1998

Always included:
Technical Support Line, Helpline, One-Year On-Site Service, FAX Support.

PUT YOUR PC TOGETHER ON PAPER.

FAX
TOLL FREE TO
1-800-524-5694

and we'll send you a special system recommendation. Or call 1-800-722-9332 and we'll recommend by phone.

OPEN
For Business

DESKTOP DIRECT from DIGITAL
Taking PCs into the world ahead

digital™

i386, 386sx, 80387sx and Intel are trademarks of Intel Corporation. MCI Mail is a registered trademark of MCI Communications Corporation Windows, and DOS are trademarks and Microsoft and MS-DOS are registered trademarks of Microsoft Corporation. Logitech is a trademark and TrackMan is a registered trademark of Logitech International S A Apple is a registered trademark of Apple Corporation Compaq is a registered trademark of COMPAQ Computer Corporation AST is a trademark of AST Researchers, Inc Dell is a registered trademark of Dell Corporation OS/2 and PC/AT are registered trademarks and Presentation Manager is a trademark of International Business Machines Q&A is a registered trademark of Symantec Corporation NetWare is a registered trademark of Novell, Inc Banyan Vines is a registered trademark of Banyan Systems, Inc VLSI is a registered trademark of VLSI Design Associates TOPCAT is a registered trademark of Westinghouse Corporation

The DIGITAL logo, DECpc, DECstation and PATHWORKS are trademarks of Digital Equipment Corporation

Your Name ______________________

Title ______________________

Company Name ______________________

Address ______________________

City ____________ State ____________ Zip ____________

Your Telephone No. ____________ Your FAX No. ____________

I'd like information on:

☐ DECpc i386 and i386sx based systems
☐ DECpc i486 and i486sx based systems
☐ The DECpc 320P Notebook
☐ The Catalog

Customization Worksheet

Your base system is a: ☐ 286 ☐ 386 ☐ 486 ☐ Other

How many applications will your PC(s) run in a typical workday? ____________

What best describes the type of work the system will be used for? (Check all that apply)

☐ Word Processing
☐ Order-entry
☐ Database (filing records)
☐ Financial Calculations
☐ Retail Store Management
☐ Desktop Publishing
☐ Education
☐ Design (CAD/CAM)
☐ Engineering
☐ Industrial Process Control
☐ Scientific Research
☐ Software Development
☐ E-Mail
☐ Other industry-specific applications (please specify)

How many people work in your group, department or small business?
☐ Less than 10 ☐ 10-20 ☐ 20-35 ☐ More

Is your operating system:
☐ DOS ☐ DOS with Windows ☐ OS/2 ☐ MAC ☐ UNIX™ ☐ Other

Which of the following graphics-oriented applications best describes your needs? (Check all that apply)

☐ Desktop Publishing
☐ CAD/CAM
☐ Realtime Modeling
☐ Animation
☐ Image Processing
☐ AutoCad
☐ Business Graphics

LAN Communication

How many PCs do you have installed? ________ From how many manufacturers? ________

What kinds of connections does your PC(s) require? (Check all that apply)

☐ Links with other PCs in the immediate surroundings
☐ Connection to the local area network (LAN) throughout a building
☐ A line to a host system in a remote location

What kind of media (cable) is used in your LANs today? ____________
What is the networking software now being used in your company? ____________
What kind of host system will your PC communicate with?
☐ DEC ☐ IBM ☐ Other ____________

What Kind of Service Do You Really Need?

☐ On-site Hardware Support ☐ Software Support ☐ Telephone Support
☐ Training ☐ FAX Hotline

How many of your users take portables on the road? ____________
Do you currently have a service contract(s) for your PCs? ☐ How many? ____________

1-800 PC BY DEC (1-800-722-9332)
Please reference AJD when you call.

The Fork in the PC Road

With IBM and Microsoft pursuing widely divergent strategies, friction between the two companies has led to a major split on the selection of a future PC operating system to succeed the aging MS-DOS

BY DAVID PASSMORE

ILLUSTRATION BY ROB COLVIN

For most of the past decade it has been relatively straightforward to select a corporate standard for personal computers. While there are now many hardware vendors from which to choose, IBM, Microsoft and Intel have, for the most part, set a single industry standard for PCs. By selecting Microsoft's MS-DOS operating system and Intel's 8088 processor chipset back in 1981, IBM virtually guaranteed the success of those companies, who were only too happy to accommodate IBM's personal computer product requirements.

However, in the selection of a future PC operating system to succeed the aging MS-DOS, IBM now finds itself in the position of going head-to-head against Microsoft in promoting OS/2 over Windows. While this feud often makes interesting reading, it has unfortunately complicated life for organizations that are trying to make PC software investment decisions. Managers can no longer feel as confident that they've made the right choice as in earlier days, when IBM and Microsoft were close allies.

If the choice were based solely on popularity, it would be quite easy to make. To date, over 7 million copies of Windows 3.0 have been shipped, versus only about 600,000 copies of OS/2. Furthermore, Microsoft claims that over 60,000 Windows software-development kits have been sold. This is in contrast to what has happened in the OS/2 developers' community, where many independent software vendors have simply abandoned OS/2 development and shifted their efforts to Windows.

Rather than admitting defeat, IBM has made some major modifications in its OS/2 development and marketing strategies that may yet make the product a commercial success. While IBM was originally rumored to be developing a whole series of advertisements based on the theme "It's Curtains for Windows!" the tremendous success of Windows has forced it to add a Windows application-programming interface (API) to OS/2. According to IBM, OS/2 will now run "DOS applications better than DOS and Windows applications better than Windows."

In many ways, OS/2 2.0 is a "born-again" version of OS/2. Unlike previous 16-bit versions, OS/2 2.0 was designed as a 32-bit operating system, and thus will be able to fully exploit the capabilities of '386 and '486 PCs. Compared to Windows, OS/2 2.0 has some significant technical advantages, such as support for more memory, true preemptive multitasking and threads, and much greater protection against application failure (failure of one application won't crash the entire system). It will also, however, require 30MB of disk storage (with documentation), and introduces a totally new Workplace Shell for managing the Presentation Manager (PM) graphical user interface that may confuse users accustomed to Windows operation.

So how is Microsoft responding to IBM's new version of OS/2? The current Windows 3.X is an add-on to MS-DOS, and thus is restricted by many of the limitations of DOS. To address this, Microsoft has been developing a new version of Windows not constrained by those limitations: Windows NT (New Technology), expected to ship in early

CIO
Telecommuting: The Home-Field Advantage
Reconsidering Legendary Strategic Systems

The basic one-year subscription rate for *CIO* magazine is $94.

Subscribe And Save.

$~~94~~* $59

Yes, enter my one-year subscription to *CIO* magazine and bill me later for only $59, a savings of over 50% off the cover price.

Name ________________________________

Title ________________________________

Company ________________________________

Address ________________________________

____

City ________________ State ______ Zip ______

**This is a domestic rate only (Canada & US). The foreign rate is $175 US.* 392

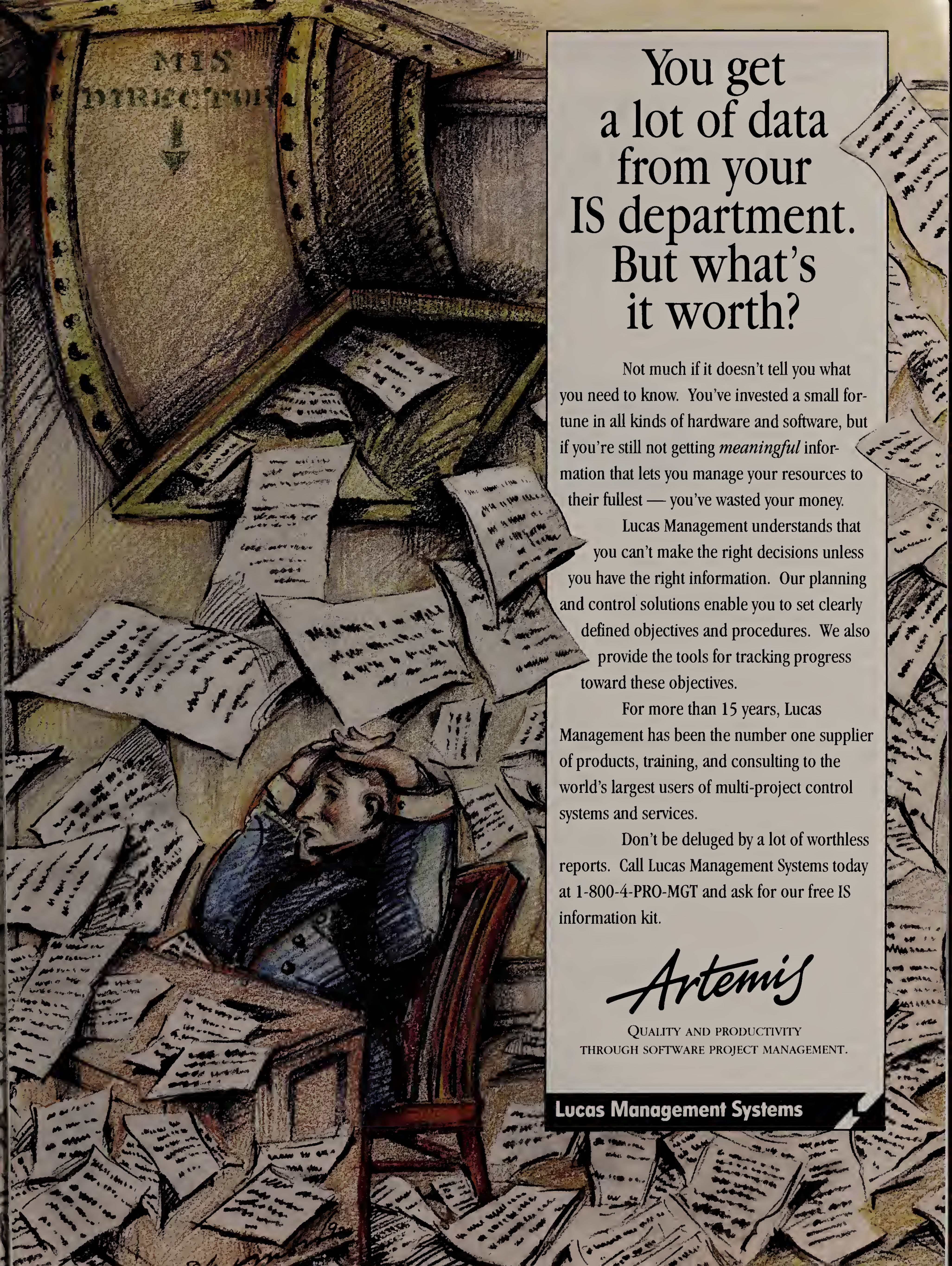
PROCESS
IMMEDIATELY

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 1020 FRAMINGHAM, MA

POSTAGE WILL BE PAID BY ADDRESSEE

CIO Magazine
Attn: Circulation Department
P.O. Box 9208
Framingham, MA 01701-9900



You get a lot of data from your IS department. But what's it worth?

Not much if it doesn't tell you what you need to know. You've invested a small fortune in all kinds of hardware and software, but if you're still not getting *meaningful* information that lets you manage your resources to their fullest — you've wasted your money.

Lucas Management understands that you can't make the right decisions unless you have the right information. Our planning and control solutions enable you to set clearly defined objectives and procedures. We also provide the tools for tracking progress toward these objectives.

For more than 15 years, Lucas Management has been the number one supplier of products, training, and consulting to the world's largest users of multi-project control systems and services.

Don't be deluged by a lot of worthless reports. Call Lucas Management Systems today at 1-800-4-PRO-MGT and ask for our free IS information kit.

Artemis

QUALITY AND PRODUCTIVITY
THROUGH SOFTWARE PROJECT MANAGEMENT.

Lucas Management Systems

1993, will be a complete operating system based on the kernel of OS/2 2.0, and thus will support 32-bit applications, preemptive multitasking, etc. Microsoft's LAN Manager network operating system may also be bundled with NT, eliminating the need to buy a separate product (for example, Novell NetWare) for file service. Finally, versions of NT will be available for both Intel-based PCs and MIPS RISC-based workstations, supporting the new multivendor ACE (Advanced Computing Environment) specifications.

What is happening is that Windows is becoming more like OS/2 (incorporating the OS/2 kernel) while OS/2 is becoming more like Windows (supporting the Windows API). Over time, DOS, 16-bit Windows, 32-bit Windows, Presentation Manager and even POSIX (Unix) applications will likely be supported by both PC operating systems. Differences in applications support by OS/2 versus Windows may become a wash, and thus may not be the most important consideration when choosing between the two operating systems.

So given IBM's and Microsoft's overall strategies, how does an organization choose between Windows and OS/2? For "Joe average PC user," interested only in personal-productivity and groupware applications, Windows is the obvious choice. There is no advantage to dealing with the additional OS/2 learning curve, since users will want to learn Windows anyway to take advantage of the majority of packaged applications; OS/2 also requires slightly more-expensive hardware. The latest Windows applications will also be available earlier on a Windows platform. Thus, even after IBM releases OS/2 2.0, Windows will remain a better choice.

For companies that already have investments in both OS/2 and Windows (or OS/2 and DOS) applications, OS/2 may be the better choice. Such a strategy will let end users pick their own personal-productivity (Windows) applications, while simultaneously running OS/2 applications that access the mainframe or other corporate systems.

For companies with mission-critical or "industrial-strength" applications written in-house, typically those involving transaction processing or corporate-database access, OS/2 will be the better choice. With support for true multitasking (especially important for supporting communications linkages to other computers), larger memory address space and better fault tolerance/application protection, OS/2 beats Windows. IBM is promoting its OS/2-based intelligent workstation as the preferred method for implementing SAA cooperative processing, linking PCs and mainframes using SNA LU 6.2 communications. IBM is also continuing to offer database- and communications-manager software products based on OS/2, important for integrating workstations into existing corporate environments—including linkages to legacy systems—and mainframe cooperative-processing applications. Many CASE tools for building enterprisewide applications are beginning to include code generators that target OS/2 workstations. So for the next year or two, OS/2 will be the right choice for IBM shops developing client/server or cooperative-processing applications.

> *Ultimately, IBM must wean itself from Microsoft if it is to maintain some control of the desktop.*

But what happens after Windows NT becomes available? Most of OS/2's technical superiority will go away—after all, Microsoft's NT will be based on much the same OS/2 kernel technology. Organizations building integrated client/server applications will want to take advantage of the widest range of communications and database packages; over time, most such software will utilize Windows APIs, not OS/2 PM. Thus, even Big Blue shops will have little reason to stick with OS/2.

Ultimately, IBM must wean itself from Microsoft if it is to maintain some control of the desktop. Fortunately, it has a number of options. IBM can immediately begin promoting its open Unix/RISC workstation technology as an alternative to Microsoft's proprietary Windows NT. It could create a relatively straightforward integration and migration path between OS/2 and AIX workstations based on the Open Software Foundation's DCE (Distributed Communications Environment) by supporting common standards including directory services, remote procedure calls and file service on both OS/2 and AIX. IBM has already indicated that it intends to incorporate DCE standards into SAA. Furthermore, IBM's recent agreement with Apple and Motorola to support AIX on inexpensive Power-chip RISC technology will give IBM the ability to produce low-cost workstations. This will counter Microsoft's ability to run Windows NT on ACE RISC technology from MIPS

IBM's ultimate response to Microsoft may be the new object-oriented operating system based on Apple's "Pink" technology being developed by Taligent (which is jointly owned by IBM and Apple). To be available in about three years, such a modular operating system will be able to support OS/2 PM and Windows (as well as Macintosh) APIs and applications.

We'll probably look back someday and be amazed that the IBM-Microsoft relationship and the "industry-standard PC" lasted as long as they did. As the pace of change accelerates and computer vendors struggle for survival, we can expect a profusion of new vendor relationships and conflicting new standards pronouncements. What used to be a relatively standard purchase, buying a workstation, will now require users to do their homework. CIO

David Passmore is a partner with Ernst & Young's Center for Information Technology and Strategy.

Now there's a true high-performance information service with automatic transmission.

It's called DowVision, and it could very well make manual information retrieval a thing of the past. Because it brings you the power of the world's premier business and financial news services automatically, and at turbocharged speed.

Here's how it works. Based on customized profiles that can be set up for your entire company, or each department, or even individual users, DowVision delivers precisely the kind of news and information your staff needs. And only what they need. (These profiles are simple enough for anyone to set up, and just as simple to change.)

DowVision selects this news from the vast resources at its command, including Dow Jones' widely respected real-time newswires and the full text of *The Wall Street Journal,* as well as BusinessWire and PR Newswire. And delivers it automatically, which means the news arrives while it's still news.

Just as important, it arrives for a fixed monthly fee so affordable that direct access to real-time business news need not be limited to just a few members of your staff. And DowVision is easily incorporated into your company's enterprise-wide network, or its various LANs.

All of which makes DowVision the one information service that can automatically enhance your company's performance. For more information, just call our toll-free number.

For more details, call
1-800-522-3567, Ext. 757.
In N.J., it's 609-520-8349, Ext. 757.

DOWVISION℠
The lifeblood of business.℠
Another service from Dow Jones Information Services.

DowVision is a service mark and *The Wall Street Journal* is a registered trademark of Dow Jones & Company, Inc. ©1991 Dow Jones & Company, Inc. All Rights Reserved.

"THE TASK IS TO INTEGRATE THE OLD AND THE NEW."
Hellmuth, Obata & Kassabaum, Architects

To a great extent, the day of the bulldozer is over.

Buildings, like the historic St. Louis Union Station, are saved. And made even more valuable by putting them to new uses. Architects call it "adaptive re-use."

There are parallels in computing.

Mainframes are saved. And made even more valuable by becoming part of the on-line enterprise. Software architects call it "mainframe integration."

There is one software architecture that is designed to integrate the old and the new: Sybase.

Sybase integrates any CICS application and data source—IMS, VSAM, DB2 and more—into an advanced client/server computing environment. The mainframe becomes a high performance server in a network of PCs, workstations and minicomputers.

Sybase. Client/server architecture for the on-line enterprise.

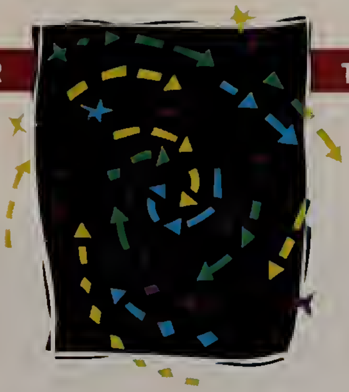
To find out more about our database, application development and connectivity products, and multi-vendor consulting services, call 1-800-8-SYBASE.

Once among the world's busiest train stations, the old St. Louis Union Station has been redesigned by Hellmuth, Obata & Kassabaum into an award-winning urban complex that includes a hotel, restaurants and shopping center.

©1991 Sybase, Inc.

SYBASE

CLIENT/SERVER ARCHITECTURE FOR THE ON-LINE ENTERPRISE



Software For The Distributed Era

The problem with the Distributed Era is that it isn't quite here yet. Still, despite lingering uncertainties, CIOs must craft effective software strategies. They must make enlightened choices about how well today's technologies will help their organizations reach tomorrow's distributed ideal. Compared with the present-day realities of tight budgets, incomplete standards and toolsets, demanding users and evolving IS skill requirements, the Mainframe Era was duck soup. Our SPECIAL SOFTWARE ISSUE shows why no one should envy a CIO...

Leading By Example
Amoco Corp.'s ability to develop effective distributed systems has entailed a careful and far-reaching transformation of its entire information systems structure.
PAGE 38

Planning Ahead
Research suggests that in five to 10 years, one in every five mid-level professional computer users will be writing applications at the departmental or company level.
PAGE 46

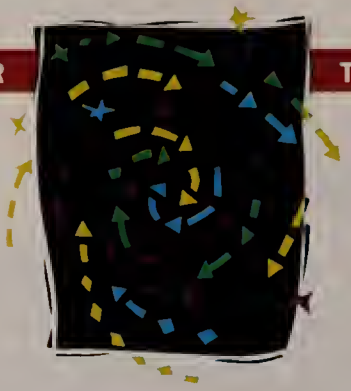
Leveraging Tools
"[O]ur management is not willing to bet the company on new applications developed with untested tools. It's a tough situation in which to make decisions," says Amdahl Corp.'s John Ahrens.
PAGE 56

Controlling Costs
Over 90 percent of the respondents in this year's *CIO* software survey say they hold software costs down by purchasing off-the-shelf products.
PAGE 66

Managing Personnel
The problem is clear. "Software development skills in Fortune 1,000 MIS [shops] are out of sync with corporate needs," states a recent report from Forrester Research Inc.
PAGE 74

LOGO BY JOHN NELSON

SOFTWARE FOR THE DISTRIBUTED ERA



LEADING BY EXAMPLE

Progress in the Pipeline

With a few confidence-inspiring applications already in place, Amoco's measured approach toward distributed processing is proving that slow and steady wins the race

BY DAVID FREEDMAN

When the Amoco Corp. customer-service center gets a call from one of the holders of its gas credit card, an agent in West Des Moines, Iowa, punches the account number into a workstation and two windows open up on the screen. One of the windows displays the scanned images of any recent written correspondence from the customer—images pulled down from an optical storage system attached to a server—while the second window contains detailed customer-account data yanked from a mainframe in Tulsa, Okla.

Workstations . . . mainframes . . . servers . . . image processing . . . . Isn't this what distributed processing was supposed to be all about?

Sure. But though such applications make it look easy, Amoco's ability to develop effective distributed systems has entailed a careful and far-reaching transformation of its entire information systems structure. And even then, Amoco is discovering that it is best off approaching distributed application development in small doses—and the company occasionally runs into difficulties anyway.

But such slow and rocky progress is all part of a necessary trade-off in moving toward a distributed environment, insists Jackie Ribich, the Amoco IS manager who oversees standards and technology in corporate IS. "If we just focused on getting as much done today as we could, we'd have chaos," she said. "On the other hand, if we waited for the right infrastructure to develop applications, we'd never get anything done."

Amoco, a $30 billion oil and chemical company, was until recently supported by a traditional centralized, mainframe-oriented IS organization. Though a certain amount of application development took place in the various operating companies—which include separate chemical-manufacturing and oil-production, -refining and -marketing businesses—a 2,000-plus-person IS staff at corporate headquarters in Chicago retained tight control of most major projects. Two years ago, however, the potential advantages of client/server networks and other forms of cooperative processing proved irresistible. "Cooperative processing is going to pro-

JACKIE RIBICH *(l. to r.),* **BART DAHLSTROM, STEVEN RUSSELL** *and* **JOHN REID** *are using advice, planning and guidance to transform the role of Amoco's centralized organization from providing applications to helping to ensure that locally developed applications are efficient, reliable and interoperable.*

PHOTO BY NEIL MACDONALD

vide many of the key benefits of the '90s," said Ribich. "It's going beyond having PCs on the desktop to weaving IS into the very fabric of the corporation."

But Amoco quickly realized that applying the existing IS infrastructure to an entirely new computing model would be tantamount to trying to squeeze a square peg into a round hole.

Instead, Vice President of Information Services John Reid determined that the centralized arrangement would have to evolve from providing applications to helping to ensure that locally developed applications were as efficient, reliable and interoperable as possible. This would be accomplished not through tight control, but rather through advice, planning and guidance. If the transformation worked, then Amoco would be on its way to achieving a coherent network of applications that utilized the right resources in the right places; if it didn't, the company would be plagued with redundant and inefficient applications. "If you aren't really careful about the way you approach distributed development, you end up with a lot of islands," said Bart Dahlstrom, corporate supervisor of computing and information technology.

The restructuring of the IS organization was swift and massive. One thousand IS personnel were transferred to the operating companies; almost overnight, the company's IS blend shifted from one that favored corporate control to one favoring business-unit autonomy. "The idea was to decentralize development while retaining an important centralized function," explained Ribich. "For those of us in corporate IS, our mission changed from providing cost-effective applications to coordinating and optimizing the efforts of the operating companies."

So far, things seem to be going according to plan. To some extent, that's because the plan has called for a carefully measured effort calculated to limit risk without losing momentum. "We're trying to demonstrate the capabilities of cooperative processing and build confidence in our new organization," explained Ribich. "The proof will be in delivering systems."

One new application that has turned many at Amoco into believers is its "terminal automation system," which automates the process of refilling and dispatching gas tanker trucks. The system keeps track of each gas station's inventory of different octane gasolines. When a truck turns up at the terminal where it is filled, its driver identifies it (and thus the stations it services) to the system via a magnetic card, and the system decides which stations should be replenished with which gasoline. The system then fills the truck with the appropriate amount and type of gasoline, making sure that the transaction is reflected in local and corporate inventory systems. All this occurs through a blend of local and remote workstations, servers and mainframes. Amoco has also installed client/server systems to help with investment banking, oil exploration and the operation of gas-station-based convenience stores.

Clearly, developing these sorts of systems requires specialized expertise. To meet that demand, Amoco has so far been leaning heavily on outside consultants for many of its cooperative-processing applications. "There are large learning curves to overcome in moving to distributed processing," said David Cagigal, operations manager at Amoco's customer-service center, which has implemented three major client/server applications. "Some of these systems outstrip our current knowledge base, so the only way to continue to pioneer while meeting our business needs is to go outside."

The complexities of cooperative-processing application development have forced a greater reliance on vendors, too, noted Ribich, since vendors' own product-development efforts have left them with a disproportionate share of the expertise in this arena. "We've been

A Well-Orchestrated Approach

How Amoco is easing its way into distributed processing

Amoco Corp. is in the midst of an ambitious program to transform its IS structure from a mainframe orientation to one built around distributed computing. Here are some elements of the company's approach, geared to maintaining progress while minimizing risk:

▶ **Evolve an IS management structure:** If computing resources are going to be decentralized, then so will application-development decision-making. Amoco spun off half its corporate staff to the business units and gave the rest an advisory role.

▶ **Take it one step at a time:** Amoco first focused on adding distributed front ends to existing applications. Now it is moving processing power out to servers and workstations. Only later will it start to distribute its mainframe databases.

▶ **Pick and choose targets:** Why distribute a smoothly functioning centralized application? Amoco is leaving E-mail and other well-liked applications on the mainframe and distributing applications like customer service that benefit from the fast response and customizability of client/server systems.

▶ **Use outside help:** Though Amoco has thousands of developers, it recognized that cooperative processing required specialized expertise its own people didn't have. Vendors and consultants helped get the first applications up and running, and now Amoco developers are getting up to speed.

▶ **Pilot heavily:** By running new applications on a small scale, Amoco can promote its successes while minimizing the potential damage from a problem.

▶ **Set standards but don't dictate choices:** Amoco's corporate IS staff recommends hardware and software but leaves the decision to the business units. Applications, however, are expected to be linkable to corporate networks and databases.

▶ **Wait for better CASE tools:** Some distributed applications are best put off for a few years until integrated CASE tools are available. In the meantime, Amoco is avoiding low-level coding, which would probably have to be rewritten sooner or later. *–D. Freedman*

Controlling the Increasing Complexities of DB2 Data Management and Movement

DB2 managers eventually must deal with the critical issues of data availability and integrity in distributed production environments. Doing so successfully will require a firm foundation.

A number of fundamental changes are evolving in database management and data communications environments that will profoundly complicate the processes by which data is managed and moved. These changes are already being felt, especially in IBM's DB2 database management environment.

Information technology professionals preparing to deal with these challenges must make solution decisions that will protect the long-term investment of the business enterprise.

The changes appearing include:

- The inevitable growth of DB2
- The use of DB2 in production environments
- The complexities of distributed processing
- Movement toward an integrated MVS environment
- The emerging impact of downsizing

The depth of complexity that is beginning to appear will increase as organizations address the issues of movement and coordinated updating of data within a totally integrated MVS environment or among heterogeneous distributed databases.

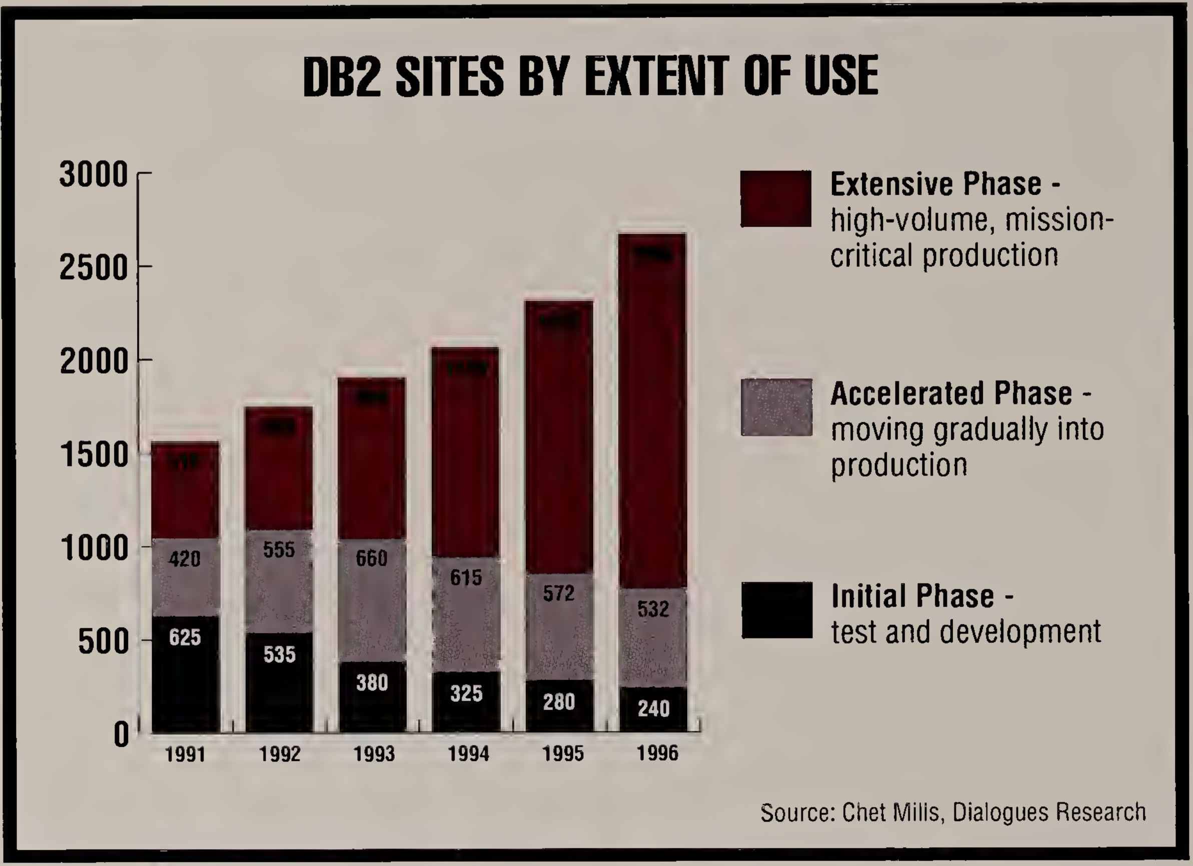
The challenges become even more daunting when dealing with the issues of recovery and restart in these same environments. In short, these changes are creating a data management environment beyond the realm of people and procedures—one that demands the most advanced, reliable and synergistic software solutions available.

The inevitable growth of DB2

DB2 will continue to grow as the strategic database management system (DBMS) of choice. The demands of this growth will be manifested in terms of CPU consumption, DASD requirements, volume of data and number of users. Information Systems shops are moving rapidly from initial use of DB2, in which it is installed and employed primarily for development projects, to accelerating use, in which it is moved gradually into the production environment. As IS shops move finally to extensive use of DB2 (See chart, page 2), where it is used for high-volume, continuous-availability applications, they are quickly recognizing the hazards associated with managing performance, availability, integrity and control of data in this demanding arena.

The most obvious initial milestone is when DB2 is moved from a test or development stage to production. At this point, the need for high data availability and integrity begins to be felt by those who manage the DB2 subsystems. This proves true regardless of the size of the environment. Demands for high data availability and performance are suddenly felt in both 24-by-7 shops and those that have some form of batch window.

There are four major reasons for the inevitable growth of DB2. First, applications can be developed much faster with DB2 than with a non-relational DBMS. Once an organization realizes that the company saves money in development and gets an earlier use of the application, the trend toward use of DB2 for development accelerates. As it does, important data becomes a part of the new DB2-based applications. It would be inhibiting to the DB2 development process to insist that data remain positioned



Source: Chet Mills, Dialogues Research

solely in a previous database management system. The result is a move toward increased repositioning of data in DB2 or toward a mixed application.

Second, applications are easier to maintain in DB2. Since most applications undergo significant maintenance over their life span, the ability to implement change more responsively improves the value of the application to the organization.

Third, the DB2 relational database management system is exceptionally capable in dealing with ad hoc requests for information without the need for program writing. This ability to respond quickly to informational needs often brings with it competitive advantage that is important to the business enterprise. As this becomes more obvious, the move to DB2 as the repository of choice for this type of data will accelerate.

Fourth, and most important, is that future technological advances—both software and hardware—will be built upon the DB2 foundation. Distributed database capabilities will evolve on a relational base. The relational implementation of DB2 is better able to take advantage of future hardware advances in memory and parallel processing. Major improvements are possible in the future through the synergy of relational concepts, operating system and hardware advances.

Other emerging technologies such as Information Warehouse, end-user computing capabilities, expert systems and object-oriented databases will be built from relational platforms.

Ironically, DB2's extensive capabilities are in themselves forcing changes in the way data must be managed. The many new uses available from DB2 are creating issues that DBAs have never had to face before. The result is that the role of the DBA is changing, moving toward that of a manager and facilitator and less of a controller. With that change has

The State of DB2 Today

by Richard Yevich, Senior Consultant, Codd & Date, Inc.

DB2, while still changing, has matured to the stage of large-scale, mission-critical applications. A database table of five billion rows, an online query system achieving close to 1,000 small transactions per second, and a batch system exceeding two million updates per hour in a 24-by-7 environment are in existence. In development, a major service firm is in the planning stages of a 130-billion-row table.

Data has matured into information, and DB2 is being selected as the information store. However, the issue of managing these data stores and achieving acceptable levels of performance requires more knowledge and use of tools than ever before.

The growth of DB2 use has far outpaced the growth of our understanding of how to manage, ensure performance and maintain integrity of the data. Complicating this further is the rapid movement into distributed systems, not only for EIS/DDS, but also for mission-critical OLTP systems.

The only downside to DB2 today is the lack of understanding of all the issues and automated tools required to manage this environment. DB2 will work exactly the way it is directed, GOOD OR BAD! With DB2, it is incredibly easy to implement poor systems and then not be able to understand, manage, monitor and correct the problems. It is a shame, because in the right environment, with the right tools, the flexibility of DB2 allows it to be corrected.

Richard Yevich is a consultant, software developer and lecturer with more than 23 years experience. He consults and lectures on relational, logical and physical database design, application design and performance issues.

come a need for fast and reliable data management tools.

Growth and new capabilities are placing new and complex demands on all data management resources—software, hardware and human.

DB2 and the critical production environment

As organizations increasingly extend DB2 usage into heavy-duty production environments, they are finding themselves faced with the same types of performance issues that exist with other DBMSs, but they are finding them much more difficult to control. DB2 data availability, integrity and recovery are now critical to the business itself, and the ability to manage data safely within the DB2 subsystem becomes vital.

To maintain the data and to keep DB2 performing efficiently, IS shops must schedule maintenance windows—periods during which they take the system down and perform maintenance jobs. These jobs include loading in new data, reorganizing table spaces, taking image copies and the like. Under these circumstances, time literally is money, and the speed and reliability of maintenance tasks becomes of paramount importance.

Most DB2 tuning and operations management must be done while the system is down, making data unavailable to users. Until recently, it was impossible to change performance control parameters (such as DSNZPARM values, buffer pool sizes, checkpoint frequency, timeout values or prefetch quantities or to change or repair an active log) without taking down the DB2 subsystem. To cancel runaway DB2 threads—a significant consumer of CPU —meant cancelling the originating address space and forcing the user off the system.

Software solutions will be necessary to ensure the high levels of performance and data availability vital to meet the demands of production environments.

Speed of recovery is another key area of concern for high-availability environments. Recovering a corrupted table space in DB2 by using the IBM recovery utility is labor-intensive and time-consuming. It involves collecting and merging data from image copies, incremental image copies, archive logs and active logs. If referential integrity is involved, not only the original table space, but also all those related to it must be recovered. For these reasons, it's impossible for an IS shop to accurately predict how long it will take to recover any given DB2 table space. The process can take a number of hours, to say the least, and the risk of error or data loss can be very high.

Getting Started With Information Warehouse

by Joyce Bischoff, President, Bischoff Consulting, Inc.

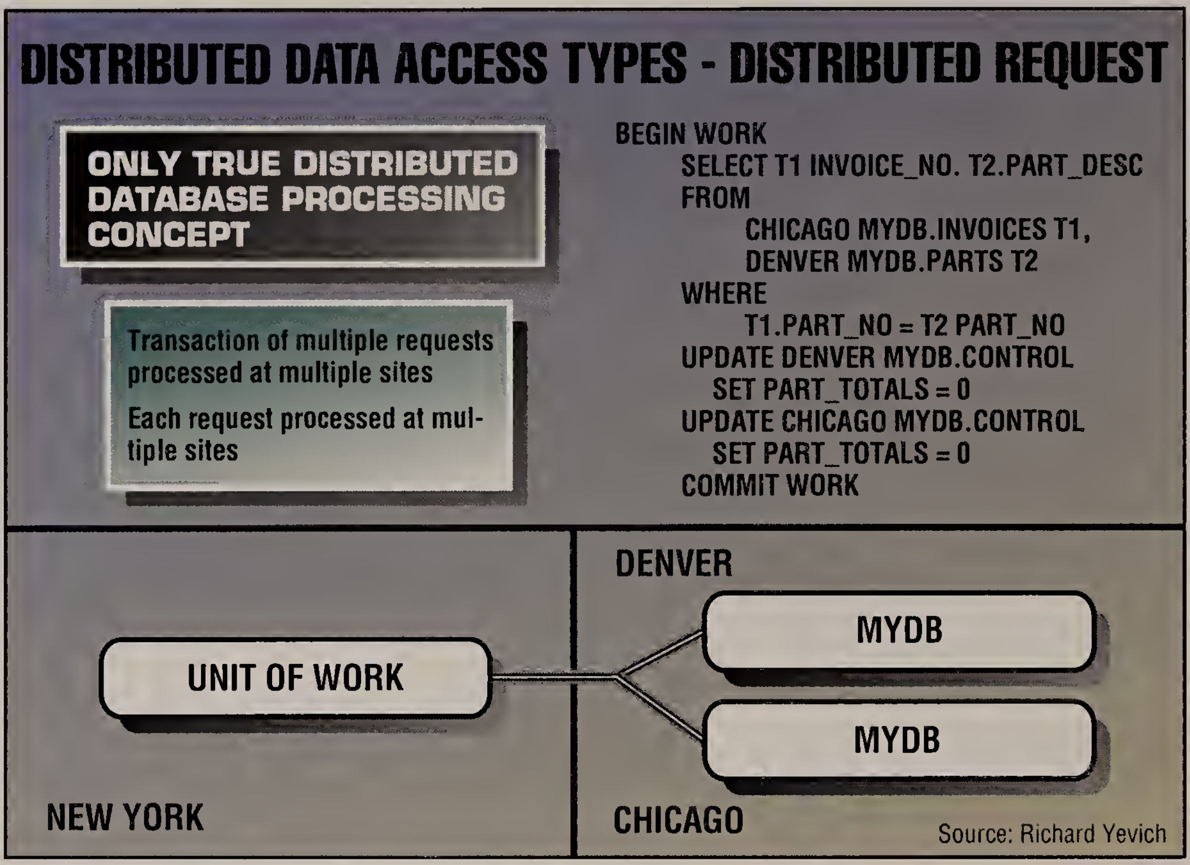
The good news about IBM's Information Warehouse is that it offers a framework for delivering business information across an enterprise. The bad news is that very few organizations are in a position to take advantage of it. The framework consists of enterprise data, data delivery, and decision support applications. Although organizations have a wealth of data, most of it is tightly bound to applications and lacks the flexibility and definition to support its movement into the Information Warehouse environment.

To take advantage of the Information Warehouse framework, a carefully planned data architecture should be built with the enterprise data model as a foundation. Without a well-planned architecture, much unnecessary DASD will be consumed by redundant data and the data structures will lack the flexibility to respond to changing user requirements. Since CPUs are not infinitely fast, considerable technical expertise will be required to create a physical implementation that performs well in a relational DBMS, such as DB2.

Strategies for data management and movement must also be planned. Data must be moved from the traditional production environment into the Information Warehouse. Tools and procedures must be in place to minimize resource down time and enable users to move data from the warehouse into personal databases on any CPU.

It is highly desirable to automate as much of the decision making as possible in the data maintenance area. Without properly maintained data, resource usage and response time will probably not be acceptable. If an organization builds an Information Warehouse, however, the rewards are potentially great: data will be a corporate asset that may be used to gain competitive advantage.

Joyce Bischoff has written articles and lectured internationally on DB2 design and performance issues and served as leader of the Task Force on DB2 Standards for Performance for GUIDE International.


DISTRIBUTED DATA ACCESS TYPES - DISTRIBUTED REQUEST
ONLY TRUE DISTRIBUTED DATABASE PROCESSING CONCEPT
Transaction of multiple requests processed at multiple sites
Each request processed at multiple sites
UNIT OF WORK
NEW YORK
DENVER
MYDB
MYDB
CHICAGO

```
BEGIN WORK
    SELECT T1 INVOICE_NO. T2.PART_DESC
    FROM
        CHICAGO MYDB.INVOICES T1,
        DENVER MYDB.PARTS T2
    WHERE
        T1.PART_NO = T2 PART_NO
    UPDATE DENVER MYDB.CONTROL
      SET PART_TOTALS = 0
    UPDATE CHICAGO MYDB.CONTROL
      SET PART_TOTALS = 0
    COMMIT WORK
```

Source: Richard Yevich

Distributed DB2: No simple solutions

Homogeneous distributed database implementation is already beginning to appear on a limited basis. True distributed access and distributed request capabilities in a heterogeneous environment will emerge as the predominant configuration of the future data management structure. As it does, DBAs are discovering, it will bring an exponential increase in data management complexities.

The very terms "distributed database" or "distributed processing" frequently mean different things to different people. For purposes of its Distributed Relational Database Architecture (DRDA), IBM defines remote request, remote unit of work, distributed request and distributed unit of work as four levels of distributed database activity.

Generally, when people speak of distributed database processing, they are referring to a distributed request, in which transactions of multiple requests are processed at multiple sites. This could be considered the ultimate goal of the truly distributed relational DBMS.

There are other, less advanced forms of distributed environments which, while not as complex as the distributed request scenario, still present significant challenges in terms of data availability, integrity, control and recovery.

It will be impossible to manage and move data in these complex environments without the use of highly sophisticated, well-designed software that will operate synergistically with other administrative tools and utilities.

The integrated MVS environment

Movement has already begun toward a totally integrated MVS environment in which data is managed and moved to and from DB2, other DBMSs and VSAM repositories throughout the VTAM network employing CICS, TSO or IMS/TM subsystems. This integrated data will be used not for development or testing but for high-volume, mission-critical applications programs that are vital to the business enterprise.

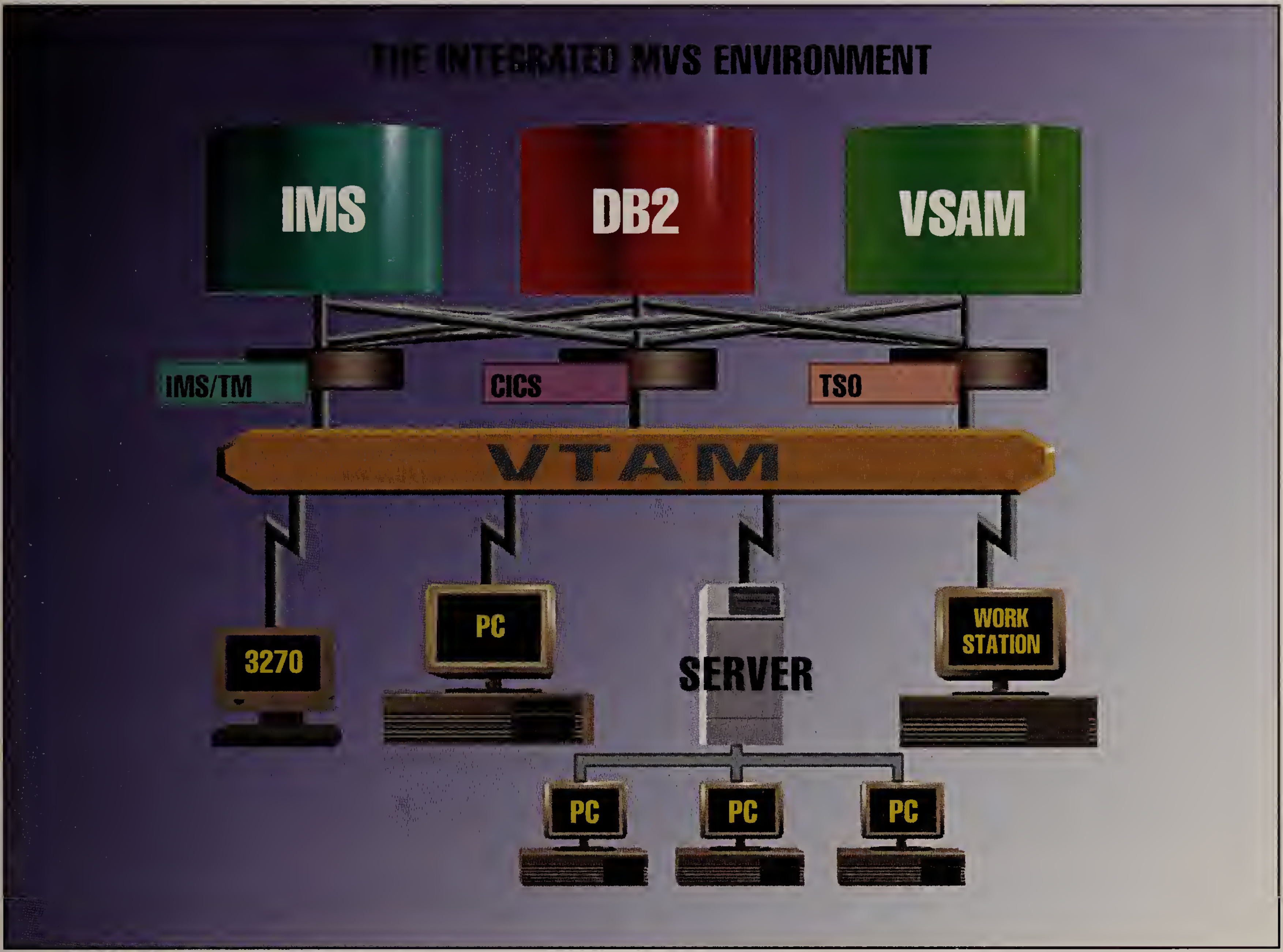
Although this may be achieved transparently to the various subsystems, the subsystems will be both logically and physically related and will have to be managed as a whole, because the applications force them to be.

If one subsystem suffers an outage, it affects the others. If one has to be recovered to a specific point in time, the others have to be recovered to that point in time. A single transaction has the power to trigger recoveries across all of the subsystems.

Solutions for this environment will have to be capable of managing data transparently across subsystem lines in a way that is non-disruptive to the normal functions of the subsystems.

The emerging impact of downsizing

Downsizing—the movement of corporate computing from the mainframe down to PCs and desktop work stations—is emerging as a significant factor in the way data will be managed and moved. Although originally perceived as a move away from the mainframe entirely, downsizing is now expected to evolve into a network that will typically include main-



frames, servers and client work stations.

Downsizing offers two major advantages to corporations—lower hardware costs and faster end-user access to data. Businesses see downsizing as allowing the flow of business data out of corporate IS operations down to workgroup computers that can turn data into information to better manage the business. Rather than just seeking cheaper hardware, corporations are working toward making end users more productive.

Downsizing brings with it costs of its own. It requires significant investment in retraining—both for end users and programmers—and in new software licensing. The greatest challenge, however, is in managing the movement and control of data within the mainframe-client/server environment. Being able to do this in an automated way is extremely important, of course, because if the organization has to have an administrator on every LAN, that will effectively erase any savings achieved in hardware.

For the move to downsizing to be successful, organizations will need two sets of technically sophisticated tools — one for managing the environment and another for coordinating the extraction and propagation of corporate data within the network.

Old problems, new environment

The issues associated with cooperative processing and distributed databases will be basically the same as those that currently exist for any database management system, but they will be much more complex to resolve.

Database administrators and systems staff will be attempting to diagnose and correct performance problems in an environment in which any number of integrated DBMSs and data communications subsystems could be at fault. Performance will be more difficult to monitor and much more difficult to tune.

When a transaction is distributed across multiple platforms, the chance of failure increases, and the risk is additive. For instance, to ensure an overall 99 percent availability of a transaction on five systems requires 99.8 percent availability on each platform. That is, what would have required a one-percent chance of failure on one platform must be reduced to a 0.2 percent chance of failure on each of the five platforms. In this case, the data manager has just lost 80 percent of his chance-of-failure pad. The need for availability is higher, the complexity of the environment is increasing, but the chance of failure must somehow be reduced.

Recovery to a point of consistency and a restart that preserves system-wide data integrity under these circumstances will present the most complex issues that information technology professionals have yet faced.

What the future will demand

Most organizations that have implemented DB2 rely on multiple DB2 subsystems to facilitate the design development, test and production stages of an application's life cycle. The data independence offered by DB2 allows the application data structures in each of these subsystems to vary for any given application.

These variations in structural elements are required to satisfy issues regarding performance, security and additional uses of data from one subsystem to another. Applications may also exist at various version levels on different subsystems. All of these factors make the task of database administration much more complex and error prone than with previous DBMS systems.

The strengths of DB2—data independence and flexibility—frustrate efforts to make implementing changes to DB2 structures a manageable process. The challenge faced by DB2 DBAs is to maximize the power of DB2's capabilities while keeping control of data structures and facilitating the responsive implementation of changes.

Downsizing and PC-Mainframe Coexistence

By Colin J. White
President, DataBase Associates

Downsizing has accelerated over the last few years primarily for two reasons. First, the price/performance of the PC compared to the mainframe has been quite attractive. Second, with the current shift in business and the economy, corporations need to be more competitive, and to be more competitive, they have to have speedy access to corporate data. Downsizing lets the PC access corporate data and turn it into information for use by business managers.

The word "downsizing" doesn't accurately describe what's occurring. I personally prefer the word "rightsizing." My perception is that there are applications that are ideally suited for work-group computing using networked PCs, but that the robustness of that environment today is not adequate to take over high-end corporate data processing applications. The so-called downsizing decision involves finding the right platform for each application. Rightsizing strategists see a need for networked PCs, but they will coexist in conjunction with mainframes. Consequently, corporations need to start looking at client-server and distributed computing to determine how desktop systems and work-group systems will work in conjunction with mainframes.

One of the key factors for successful downsizing will be managing these mainframe-to-PC environments. When organizations start developing and deploying applications that involve dozens, perhaps hundreds of PCs, the real challenge is going to be in managing and synchronizing the system software, applications software and PC configuration files. Unless we get well designed and automated tools in this area, the hardware cost savings of downsizing will be offset by the additional cost of administering such a system.

Another major hurdle is the movement of the data. About 80 to 85 percent of corporate data today is not in a relational form. It's in flat files, VSAM files and hierarchical databases, e.g., IMS. Secondly, a good deal of that data is not in a form that is usable to the end user. It's not well-structured for end-user access. In order to distribute the data to the PC level, organizations will have to copy that data to a relational information database and then stage it down to PCs.

For the move to downsizing to be successful, organizations will need tools to manage a distributed environment. Downsizing will require two sets of tools—one for managing the environment and another for coordinating the extraction and propagation of corporate data around the network.

Colin White is president of DataBase Associates, a database consulting firm based in Morgan Hill, California and is editor/publisher of InfoDB and Database Review. He has co-authored books on IBM's DB2 and SQL/DS products and is Conference Director for DB/EXPO.

A key requirement for the information technology manager of the future will be a complete set of solutions for managing change within a complex DB2 environment that is comprised of multiple subsystems as well as CASE tools and various other repositories for structure definitions.

Change will have to be implemented while preserving structure modifications that have been made locally for tuning, data access or security purposes. CASE tools and other repositories used for application design must be synchronized with DB2's implementation of data structures. Bachman Information Systems, for example, provides such synchronization through its unique Model-Driven Development architecture.

Beyond the realm of people and procedures

The complexity continues to increase when one considers the level of effort required to recover and restart even a small part of any of these same operating environments. Recovery, of course, means with full data integrity and within a time frame that is acceptable to enterprise data availability needs. It becomes obvious that recovery from a system-wide failure that involves 10 DB2 subsystems residing in a heterogeneous distributed environment sharing data with 100,000 work stations where data also resides would be far too complex and time consuming for a people and procedures alone scenario.

It would have to be done through a software solution, and that software solution would require more development time, expense and sophistication than most IS shops and the vast majority of software vendors have or can afford.

It's a tough problem, but it's not impossible. The answers are to be found in technology leadership, quality, experience, and vision.

The need for technology leadership

To put it simply, it will be incumbent upon a third-party software developer to recognize these approaching problems and begin to work toward their solutions.

It will have to be an industry leader, one with extensive experience in the database management and data communications world. It should be one that has historically led the way with new and reliable technology. Finally, it must be one that is able to analyze and understand the complexity of the problems it has been asked to solve and one with the technological sophistication and capital strength to develop solutions to those problems.

In fact, that has already begun to happen.

One software vendor already provides an integrated set of high-performance tools that handles today's tactical problems and provides strategic solutions for the future.

One software vendor already has in place fast, reliable products that are horizontally integrated to provide solutions across multiple subsystems such as IMS, DB2, CICS, TSO and VTAM. These products fulfill day-to-day operating needs for data availability, integrity and recovery capabilities in complex integrated production environments.

One software vendor is already developing vertically integrated software solutions that will provide functional integration consistent with the strategic requirements of the future.

That vendor is BMC Software, Inc.

Why quality is critical

"There is no equivalent to a BMC product."

— Max Watson,
Chairman, President and
Chief Executive Officer,
BMC Software, Inc.

In the world of continuous-availability or 24-by-7 IS shops, there is no "almost" scenario. Database management systems and the administrative tools and utilities that support them must be fast and reliable. They must be designed to be safe and effective in the complex integrated environment of today and tomorrow. There are no bargain-basement answers.

The data management world continues to move into ever more complex integrated and distributed environments. The problems of maximizing performance, providing optimum data availability, protecting data integrity and ensuring database recovery and restart capabilities will demand a set of integrated, high-performance software solutions that span all of the subsystem environments.

For emerging DB2 shops, where initial concerns typically focus on development tools, decisions must be made to protect the much larger investment in production. Selecting tools based on a single function will not create the solid foundation required for the future.

The only choice is BMC Software

BMC Software, Inc. has led the way in developing software solutions for IBM and IBM-compatible mainframe database management and data communications systems, including IMS, DB2, CICS and VTAM. BMC is the only software vendor that designs and develops solutions for data management and data movement across these integrated subsystems.

BMC is continuing to provide new products that meet the growing needs of this environment as it increases in size and complexity. It is for this purpose that BMC returns an industry-leading 23 percent of its revenue to research and development and product support—two areas in which BMC customers, in an independent survey, ranked BMC as the industry leader.

In addition, BMC is being called upon by concerned information technology professionals to provide solutions to the emerging problems of distributed processing—management of performance, change, recovery and restart. In fact, BMC began to address these issues some time ago as part of its research and development strategic planning. New products to meet these and other database management and data communications needs will be announced in the near future. Still others will follow.

The issues are complex. They require a robust foundation. Only BMC Software can offer the foundation and the demonstrated track record to deliver future products to meet the increasing complexities of data management and movement.

For reprints of this article or to talk to a BMC software consultant, call TOLL FREE in the U.S. and Canada, 1 800 841-2031 or FAX 713 242-6523.

BMC
SOFTWARE

The Experience. The Technology. The Future.

P.O. Box 2002, Sugar Land, Texas 77487-2002 U.S.A.
Call toll free in the U.S. and Canada: 1 800 841-2031 • FAX: 713 242-6523

©1992 BMC Software, Inc All rights reserved The products and trade names mentioned herein are trademarks, registered trademarks or service marks of their respective companies

A STEP AT A TIME: *From neighborhood gas stations to North Sea oil-production facilities, Amoco is approaching the transformation of its entire information systems structure in small doses.*

PHOTOS COURTESY OF AMOCO CORP.

used to doing everything ourselves," she said. "Now we have to think of vendors as partners."

But while the company has relied on outside firms to get its first applications up and running, it has made transferring cooperative-processing development skills to its own people a top priority. More than 1,000 Amoco analysts are now doing development work in a networked workstation environment, an important first step. "You want people to develop in the same distributed environment they'll be delivering systems to," explained Steven Russell, manager of systems development. At this point, a large percentage of the development work is still done outside a client/server environment on PCs and then transferred to a network for testing, but gradually most developers will be brought onto workstation networks.

One problem slowing down the move to cooperative processing is a lack of integrated CASE and other tools for this environment, according to Amoco. "The lag in tools is being addressed very slowly," maintained Aldona Valicenti, manager of systems development for Amoco Chemical Co., which has implemented customer-service and human-resource client/server applications. "Client/server architectures tend to involve components from multiple vendors," she said, "and most tools have trouble servicing a heterogeneous environment." Russell agrees. "We want a full-life-cycle CASE product," he said, "and right now most are either GUI [graphical user interface] only or have to be pieced together. I think it will take about two years before we see the kinds of tools we're looking for." The shortage of high-level tools makes it tempting to fill in the gaps with low-level language programming, he added, but he insisted that's a mistake. "If you do that, you'll end up with another legacy that has to be re-engineered somewhere down the line."

To take some of the pressure off during the difficult transition to cooperative processing, Amoco has been trying to phase in degrees of distribution in its application development. Many of the first applications simply stick a more friendly interface onto an existing application with a workstation front end tied via server into a mainframe. Not only does that approach make application development simpler than would a true scratch build, but it preserves the company's investment in existing systems. "We're trying to extend the useful life of the more-than 1,000 applications we've built in the past two decades," explained Russell. "As time goes on, we'll move from distributing the presentation of centralized data to distributing the processing and functionality, and eventually to distributing most of the databases themselves."

But even putting a new front end into place has its challenges, thanks to the fact that end users tend to become far more demanding in a distributed environment than they ever were in a mainframe-oriented en-

"Now every client wants to help you figure out what technology to use. When we sit down to talk over their requirements, they insist we include their privately hired consultant. Everything is up for grabs."

–Ernie Akemann

vironment. Since some of the processing will be done on their own desktop machines, they often demand that a particular PC spreadsheet or database package be incorporated into an application, explained Ernie Akemann, technical consultant for distributed applications. "Now every client wants to help you figure out what technology to use," he said. "When we sit down to talk over their requirements, they insist we include their privately hired consultant. Everything is up for grabs."

"**If we can help clients clear through the morass of cooperative processing, they'll beat down our doors. Otherwise, we're going to end up doing a lot of re-engineering."**

–Jackie Ribich

Of course, added Akemann, that's not necessarily bad; the ability to blend popular user interfaces into a larger architecture is one of the great advantages of cooperative processing. The problem, rather, is that some end users are occasionally narrow-minded and inflexible about the best way of accomplishing this goal. As a result, noted Valicenti, it sometimes falls on IS to step in and make sure that a planned application meets the needs of a wide range of end users, and not just a few particularly outspoken ones. "A lot of end users make the mistake of assuming that what's right for them will be OK for the other 100," she said.

The challenge for corporate IS at Amoco now is to be able to provide this sort of guidance to local application developers without forcing it down anyone's throat. "We need to find a different way to give advice," said Ribich. "Every project has a different goal, and we have to be able to see the value to the client and offer a way to add to it. If we can help them clear through the morass of cooperative processing, they'll beat down our doors. Otherwise, we're going to end up doing a lot of re-engineering."

Just one little stumbling block: Before the people in corporate IS can tell everyone else about the ins and outs of distributed systems, they have to figure them out themselves. "We spent 30 years working on the mainframe versions of these problems, and we had them all solved," said Dahlstrom. "Now we face most of the same fundamental issues, but it's multiplied across thousands of workstations." The top priority is to avoid ending up with applications that keep data locked up and inaccessible to other applications throughout the company. "Data used to be focused in specific business-function applications," said Russell. "Now we're looking at sharing data among a portfolio of applications."

Corporate IS is also setting up special teams to help various business units cope with such issues as project management, software distribution and end-user training. And although headquarters puts out a *Consumer Reports*-style bulletin recommending certain software packages within each category to minimize variety and redundancy, business units are free to put in whatever

TECHNICAL PROFILE

Amoco Corp. is a $30 billion company that produces, refines and markets oil, and manufactures chemicals. The company recently decentralized most of its corporate information systems functions to its operating divisions and has made a commitment to gradually shift from a mainframe, data-center orientation to a distributed-processing environment in which client/server systems will play a key role.

Large and Mid-Range Systems: The company operates two data centers, one in Houston and one in Tulsa, Okla. The centers offer a combined processing capability of about 1,000 MIPS, on mainframes ranging from IBM 4361s to IBM 3090-600Js, as well as IBM-compatible systems from Amdahl and Hitachi Data Systems. The operating companies also run a range of minicomputers from Digital Equipment Corp. These systems run all the major operating environments, with most application software having been developed in-house.

End-User Computing: About 20,000 PCs, including IBM-compatible machines and Apple Macintoshes, are currently running at Amoco. Many of these are connected to Novell and other local area networks. Over 1,000 PCs and workstations are now connected to Unix-based and other client/server networks, and that number is expected to grow rapidly over the next few years.

MAKING HISTORY: *When Charles Lindbergh made his historic transatlantic flight he fueled the plane with unleaded Amoco gas. Today the company is again breaking new ground with an ambitious move to distributed computing.*

PHOTO COURTESY OF AMOCO CORP

they want as long it can be made to communicate with other packages. "The standards that define how different pieces work together are more important than those that say which product or vendor to go with," said Russell. "Increasingly, we are becoming more systems integrators than code developers."

Corporate IS also insists on carefully planned pilot versions of all proposed distributed applications. "The technology is still maturing, and this is a conservative culture," said Russell. "Each pilot acts as a case study that can teach us something. Right now we want to assemble a nucleus of applications we can build on." To further minimize risk, Amoco is being fussy about which applications end up in this nucleus, picking and choosing those that best take advantage of the front-end capabilities of distributed processing. Thus image processing, graphics-dependent technical computing, and applications like customer service where there is a large degree of complex human interaction are among the projects that get higher priority. For now, large number-crunching applications will stay on the mainframe. "Where access by a large number of users and data security are important, the mainframe will always have a role," said Dahlstrom.

In addition, Amoco is determined to follow the adage, "If it ain't broke, don't fix it." The company is in no hurry to move an application to a distributed environment if it seems to be working well in a centralized form. "We've had fairly sophisticated mainframe-based office-automation applications here since the early '80s, so we don't get very excited about the idea of a client/server E-mail package," explained Dahlstrom. "One of the challenges is to preserve the good things we've already accomplished and focus on those projects that can accomplish something dramatically different."

Cagigal conceded that these policies sometimes make for slow going, noting that 90 percent of the applications in the customer-service center are still stuck in the mainframe environment. "We're not moving to distributed computing as fast as we'd like," he said. "In the long term we'll pull most of it into the new environment, but for now we have to satisfy the traditional thinkers who question whether that environment will be as durable as the mainframe. I think it will be, but that conjecture has to be rooted in an historical frame of reference." Making history takes time, but for Amoco it's worth it. CIO

David Freedman is a freelance writer based in Brookline, Mass.

Application backlogs.

If development's at a stand

In two or three years your company will have changed, your markets will be different, your competitors will be using new tactics, and the applications you needed today might be ready.

So it goes with software development. Most large projects are backed up so long, by the time an application is new, it's old. Worse, it may not even be what was asked for in the first place.

This dilemma is anything but acceptable, so IBM has launched a major effort to speed things up. Working with leaders in CASE technology, we're building a new framework called AD/Cycle™ that's giving the entire development cycle something it never had before;

© 1991 IBM Corp AD/Cycle is a trademark of IBM Corp

still, how fast can the rest of your business go?

uniform standards for streamlining the process from start to finish.

AD/Cycle also includes a host of new tools, both from IBM and our business partners: CASE tools for planning, analysis and design, languages, generators, plus testing and maintenance tools, all with a structure for coordinating their efforts.

And to help executives and programmers think more alike, AD/Cycle offers advanced methods for sharing information so that everyone can work on the same wavelength, so the end product will be right.

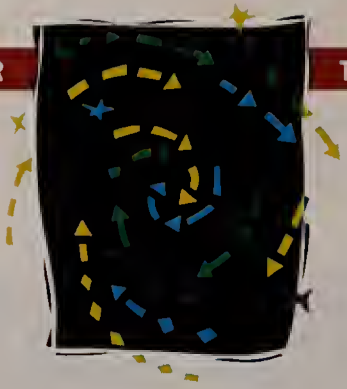
Over 60 AD/Cycle products are available today, and scores of CASE vendors have signed up for AD/Cycle. Which means it's already gaining acceptance as a standard for application development, and much more is on the way.

Companies like Eastman Kodak, Phillips Petroleum, USAA and Continuum are now using AD/Cycle tools with good results. Clearly, the sooner you get started the better, and there's plenty to start with now.

The roots of today's backlogs are many, but the biggest culprits have been a lack of standards and direction—the very ills that AD/Cycle is designed to cure.

For more information about our growing family of AD/Cycle products call 1 800 IBM-CALL, ext. 822.

IBM®



PLANNING AHEAD

How To Be Wary Without Waffling

In the unstable and still-evolving distributed environment, CIOs face the need to move forward without moving too far, or too fast, in the wrong direction

BY MEGHAN O'LEARY

Planning for software development and maintenance in a computing environment characterized by changing and still-emerging technologies is a game of educated guessing. As the architects of future distributed computing, CIOs face a host of imminent software support and management issues that they must plan for today. Still, as network power and control continue migrating steadily outward, the availability of development tools and agreement on software and hardware standards have not kept pace. While CIOs have varying approaches to making software decisions in such an unstable environment, they agree that companies must move cautiously, distribute one application at a time, and make do with the standards, development tools and network-management procedures available now.

"The problem right now is that the CIO is being asked to make decisions [with regard to future economics, reporting structures and outsourcing] without any ability to see what the long-term implications are going to be," said Bruce J. Rogow, executive vice president of consulting services at the Gartner Group in Stamford, Conn. "Let's take an outsourcing decision. Today it's made primarily on the financial level—how much does it cost us to run our own [system] or to outsource?" But in a couple of years, said Rogow, "the distributed environment will not look at all as it looks today. And unless you have articulated that environment, you can't tell whether what the outsourcer is providing for you today will be useful in the future."

Before making any long-term agreements affecting software development and maintenance, CIOs must develop a multiyear

technical and architectural strategy, Rogow said. They must know what their distributed network will look like—where software and systems will reside, what kinds of data sharing will take place, and what sorts of systems will support the network. In developing such a strategy, CIOs will be forced to face the complex technical and organizational issues of distributed software development and maintenance.

In the shorter term—Rogow estimates an architectural strategy could take two years to create—the Gartner Group recommends a stopgap strategy it calls "bifurcation," which involves ruthlessly driving down the unit cost of the existing platform and reinvesting the money saved, or a portion of it, in the transition to a new, distributed platform.

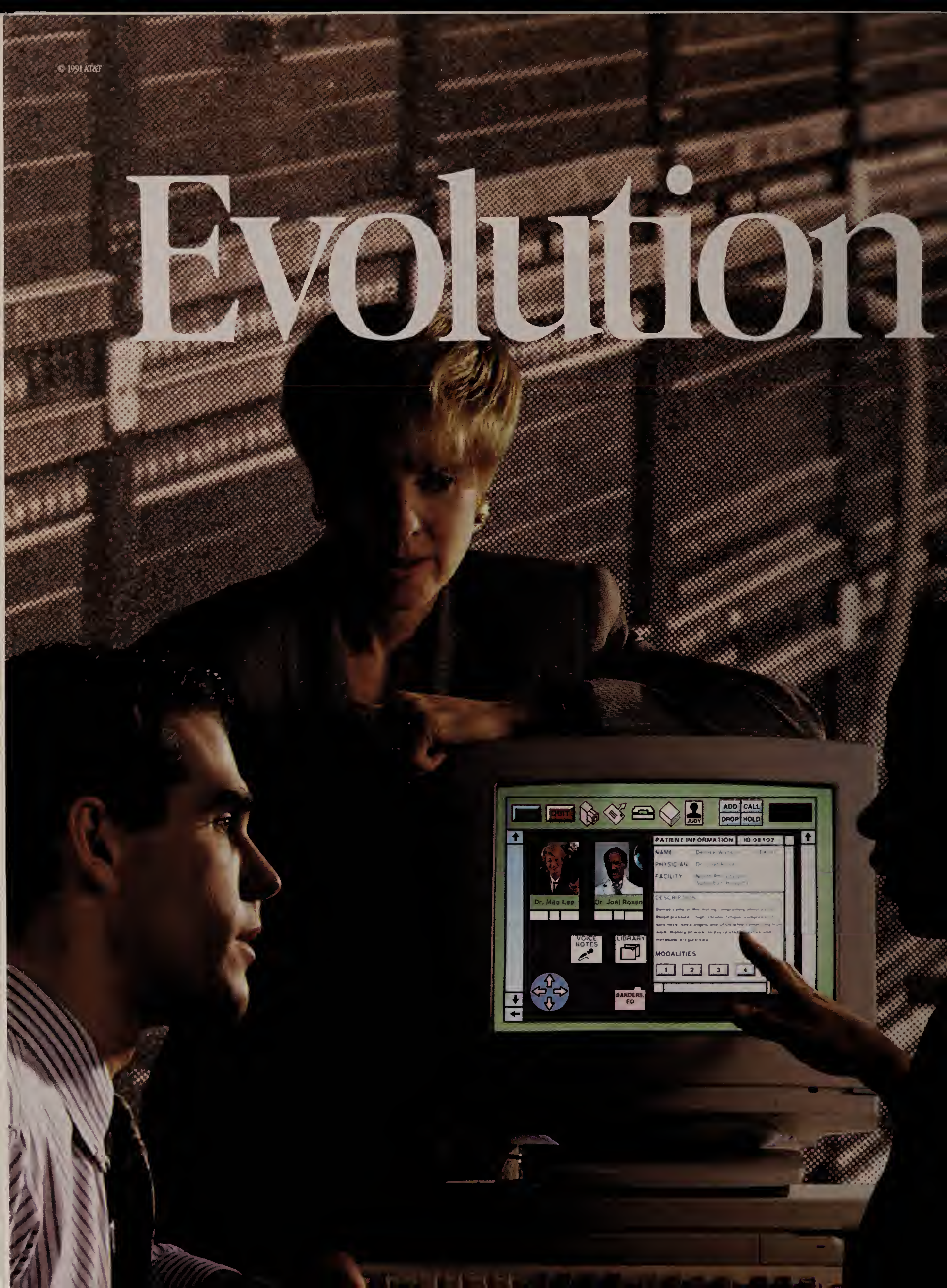
The business climate today is such that CIOs are practicing Rogow's bifurcation strategy by default. Many are under management mandates to cut their computing costs, and fewer have additional funds for new investment. Few CIOs have comprehensive long-term architectural strategies in place, but all are dealing with the technical and management issues that will allow them to develop software for a distributed environment.

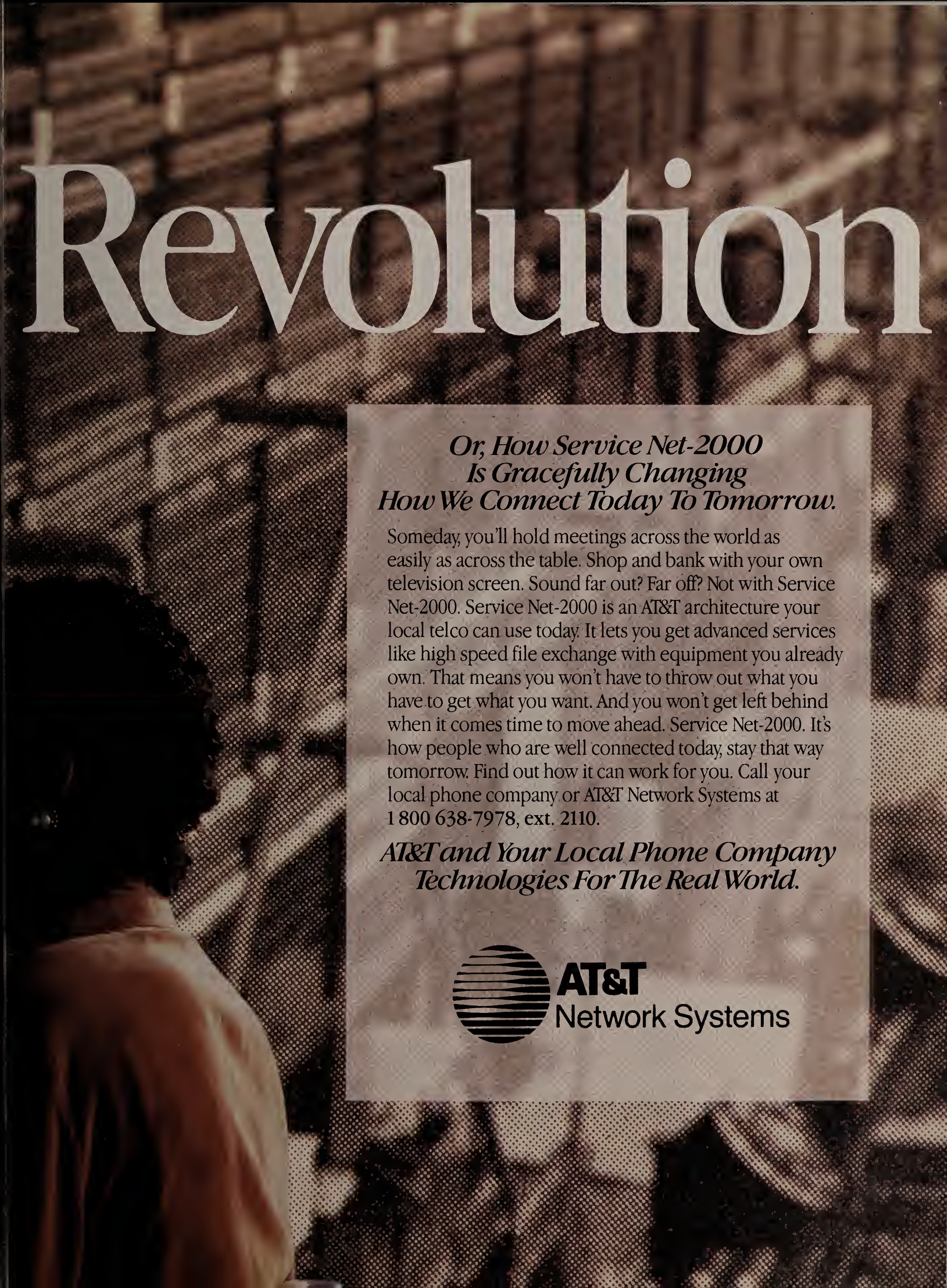
First among these issues is standards, both for software platforms and for development environments. The lack of mature technology—hardware and software—for distributed computing makes choosing standards a difficult job for CIOs. "The technology that we have available to us in 1992 is not the technology this environment is going to be based on," said Rogow. "We're between what we call master platforms. The first tangible products from the ven-

> **"The problem right now is that the CIO is being asked to make decisions without any ability to see what the long-term implications are."**
>
> *–Bruce J. Rogow*

ILLUSTRATION BY ROBIN JAREAUX

© 1991 AT&T


Evolution
QUIT
JUDY
ADD
CALL
DROP
HOLD
Dr. Mae Lee
Dr. Joel Rosen
VOICE NOTES
LIBRARY
BANDERS, ED
PATIENT INFORMATION
ID 08102
NAME
PHYSICIAN
FACILITY
DESCRIPTION
MODALITIES
1
2
3
4



Revolution

Or, How Service Net-2000 Is Gracefully Changing How We Connect Today To Tomorrow.

Someday, you'll hold meetings across the world as easily as across the table. Shop and bank with your own television screen. Sound far out? Far off? Not with Service Net-2000. Service Net-2000 is an AT&T architecture your local telco can use today. It lets you get advanced services like high speed file exchange with equipment you already own. That means you won't have to throw out what you have to get what you want. And you won't get left behind when it comes time to move ahead. Service Net-2000. It's how people who are well connected today, stay that way tomorrow. Find out how it can work for you. Call your local phone company or AT&T Network Systems at 1 800 638-7978, ext. 2110.

AT&T and Your Local Phone Company
Technologies For The Real World.

AT&T
Network Systems

> **"The programming part is maybe 15 percent of the development activity; 85 percent is figuring out the business problem you're going to solve, communicating with users, helping them understand the way they work, and training them to use the application."**
>
> *–Jim Smallman*

dors—real products—won't be out until about 1993."

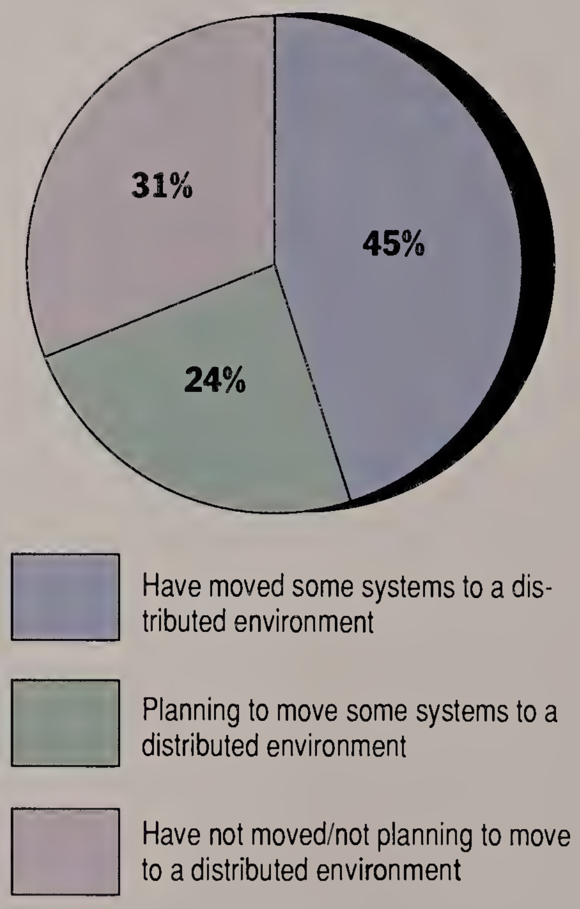
CIOs, however, can't delay every standards decision until development catches up with the sales pitches. They are driven by the immediate requirements of their users and a need to provide better functionality now while exerting some kind of control over the software and hardware that end up in their corporate networks.

Colby Springer, vice president of IS for Dallas-based eye-wear chain Pearle Vision, is still waiting to find the 4GL and CASE tools he'll use to develop systemwide software in Pearle's growing distributed environment. In the meantime, he and his staff are building effective distributed systems by writing what Springer calls "interim code" to allow their Unix and AS/400 systems to communicate with their mainframe system. This temporary solution has enabled Springer to move a lens-grinding application from the mainframes to Unix systems in the stores. The Unix machines can access the mainframe for specifications and use their own processing power to allow custom grinding of lenses, something the mainframes were too overloaded to handle.

Possibly more noteworthy than the 45% of survey respondents who have already implemented at least some distributed systems are the nearly-one-third who haven't, and have no plans to.

1992 CIO SOFTWARE SURVEY

Breakdown of Companies Surveyed



Total number of respondents: 98

Springer admits that his approach is risky because the interim code may not ultimately be a part of the company's distributed architecture. "We may end up throwing part of it away," he said, but the savings and control that the company gets from using interim code justifies that risk.

"Where we know it's permanent, we do it," said Springer. "But sometimes the value of interim applications is so great that we can't wait for the standards to exist, so we pick what we think is best and go forward."

Duey Kerper, vice president of MIS for SONAT, an energy concern in Birmingham, Ala., has standardized on software made by Software AG, of Reston, Va., a vendor that is fast developing software and tools for distributed environments. "To the extent that we can, we want to keep the software homogeneous," Kerper said. "Not all the products they promise are there yet, but all of those products will [eventually] help us to deal with maintenance and compatibility issues."

For the longer term, follow the rules, advised Jim House, information services manager for the mining group of Morrison Knudsen Corp. in Boise, Idaho. House and his group didn't know where to begin to set standards, so they rely on the Open Systems Interconnect model when buying and developing systems.

While they grapple with the standards for developing software, CIOs must also think ahead to supporting that software in a decentralized, distributed environment. It's no secret that the tools for managing distributed networks lag far behind people's ability to build the networks themselves.

David Briggs, director of MIS for W.R.

THINK OF IT AS YOUR EMPLOYEES WORKING 50% FASTER.

STROBE
BY PROGRAMART CORPORATION

The Seven Pillars of Wisdom

According to one consultant, the distributed future is insupportable without these building blocks

Bruce Rogow believes that CIOs should be architects rather than engineers. "Engineers worry about how do I make it work," said Rogow, executive vice president of consulting services at the Gartner Group, in Stamford, Conn. "Architects worry about form, function, design, placement, space, time and dollars." Following, from the ground up, is the Gartner Group's seven-tiered blueprint for a well-rounded distributed network.

Technology Layer: Specifies the actual hardware and operating software and is "worthless" without the other layers, according to Rogow.

Middleware Layer: Comprises the elements that make up open, distributed systems—remote procedure calls, GUIs, compound document architectures and directory services. "Unix is not any more open [by itself] than anything else."

Service Layer: Includes such general network features as online transaction processing, E-mail, imaging and directory services.

Data Layer: Deals with data definitions and database access.

Application Layer: In which CIOs set down guidelines for where applications will reside—which will be local and which will be centralized.

Management Layer: Addresses organizational structure, budgeting, chargeback mechanisms and management controls.

Executive Layer: Includes economic guidelines, funding plans, reporting structures and plans for outsourcing. *—M. O'Leary*

Grace & Co's. Construction Products Division in North Cambridge, Mass., believes that management tools for distributed networks will eventually appear. He's willing to wait for them. Briggs manages centrally the six minicomputer installations hanging off of Grace's corporate mainframe, but he has given responsibility for the eight distributed LANs to the locations that use them. Each plant has a nontechnical staff member assigned to watch over its LAN. Briggs's staff takes care of any big LAN problems, but deals primarily with the production-oriented minicomputers. Briggs is able to troubleshoot the user-managed LANs with reasonable efficiency, but he expects to hit a management wall as he adds more LANs. For that reason, he is beginning to retrain IS staff as well as functional staff in LAN management.

Rather than enlist users in his efforts to support remote LANs, Kerper makes his LANs centrally supportable by keeping a tight rein on software standards throughout the company and enlisting functional heads to uphold these. This approach allows him to hold down support needs and staff levels. "We don't like to use the word 'control,' but we try to be involved in everything," said Hayward Dunkin, Kerper's director of systems development.

Nevertheless, most experts accept that some degree of user-supervised software maintenance is a given in a distributed environment. In fact, many also predict that business units equipped with local power, distributed access to information and powerful development tools will eventually be much more involved in developing their own applications. Neal Hill, a senior analyst in the Software Strategy Service for Forrester Research Inc., in Cambridge, Mass., said that the company's surveys of users indicate that in five to 10 years, one in every five mid-level professional computer users will be writing applications at the departmental or company level. "All of a sudden you're looking at a user population of 8-to-10 million writing their own applications. That's a staggering number."

CIOs can't delay every standards decision. They are driven by the immediate requirements of their users and a need to provide better functionality now while exerting some kind of control over the software and hardware that end up in their corporate networks.

While some CIOs might be inclined to resist heavy departmental involvement, most agree that it is inevitable as LANs proliferate. "If I have a dozen locations," said Briggs, "for me to have 12 technicians . . . handle those locations centrally would be too costly."

CIOs have to plan now for that eventuality by training business units and finding ways to give them formal IS support. One

THINK
OF IT AS
A FREE
MAINFRAME.

STROBE
BY PROGRAMART CORPORATION

How can CIOs grow their programmers' consultative skills? Jim Smallman has put some of his programmers into a development partnership with one of the company's biggest customers. "It gives people incentive to be good citizens. You can't be a jerk in front of a customer. With customers, everybody's trying to make it work."

option, according to Hill, is to create a User Development Support function within IS.

"Central IS has to come to grips with the need to move their people out [into business units]," Hill said, adding that if they don't, business managers are likely to hire their own IS people. He cautions that programmers will require considerable retraining in order to become effective problem solvers. "IS needs to bring in end-user support specialists—not just coders, but people specialists who can go out and interact with people."

The need to find IS people with a broader skill set isn't lost on CIOs. Jim Smallman, senior vice president of information services for Burlington Air Express in Tustin, Calif., knows what his development tools will look like five years from now, but is less sure of what his programmers will look like. Smallman has begun to emphasize business problem-solving skills over simple programming expertise. "The programming part is maybe 15 percent of the development activity; 85 percent is figuring out the business problem you're going to solve, communicating with users, helping them understand the way they work, and training them to use the application."

Smallman is attacking that learning curve by putting his programmers into development partnership with one of the company's biggest customers, a major British exporter. He chose a popular domestic product for documenting heavy freight shipments that the company installs in customer locations, and consulting with the client about what features and functionality it would need to be able to use the product internationally. The partnership resulted in the decision to add international shipping and currency features and to port the application to a Unix environment so that the client could communicate with Burlington's U.S. staff. Smallman expects to gain a lot of support within the corporation as he enhances an already-popular application and makes a large customer very happy.

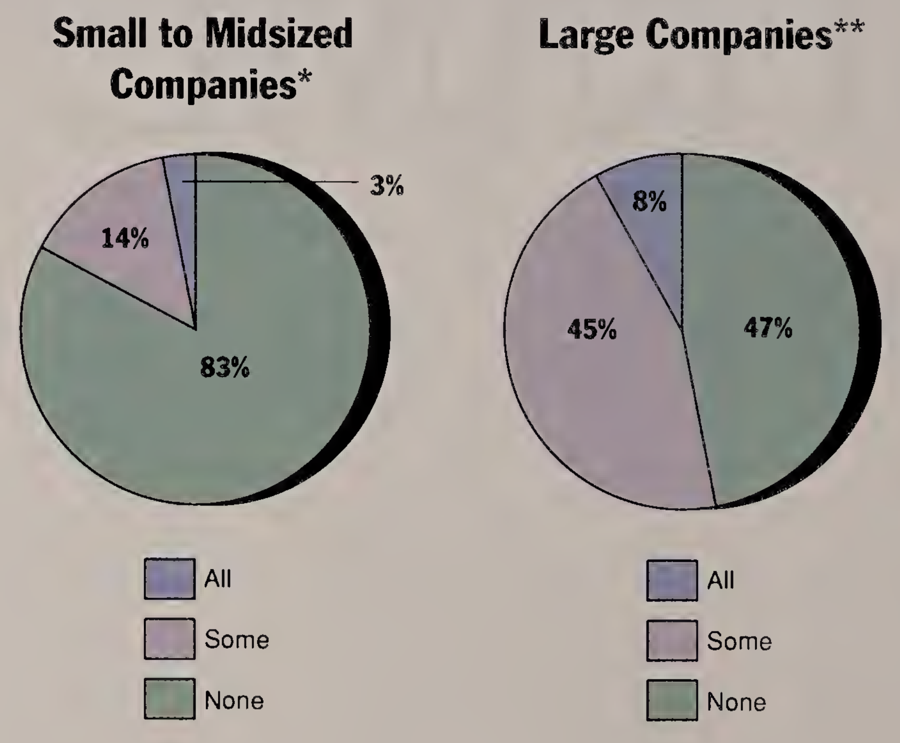
He also expects IS people and businesspeople to learn team skills from the project. "It's nice to have a customer in the loop," he confided. "It gives people incentive to be good citizens. You can't be a jerk in front of a customer. With customers, everybody's trying to make it work."

Smallman is perhaps an embodiment of the view that CIOs will redefine their positions in order to facilitate distributed software development. "The CIO is still considered the standard-setter and source of major IS influence in the corporation," said Norm Weizer, a senior consultant in the Information and Telecommunication Systems Practice at Arthur D. Little Inc. in Cambridge, Mass. "But CIOs are no longer representatives of applications." Instead, the CIOs that Weizer sees are becoming chief architects, facilitators and—it was probably inevitable—consultants. CIO

1992 CIO SOFTWARE SURVEY

Mainframe Retirement

As a result of the move to distributed computing, some companies — particularly large ones — are planning to get rid of some of their mainframes or central processors



*Under $1 billion: 30 respondents **Over $1 billion 36 respondents

WHEN YOU THINK OF APPLICATION PERFORMANCE, THINK OF STROBE.

You know that application performance can affect your company's productivity, efficiency and even its bottom line. But did you know there's a product to help you manage, measure and control it?

It's called STROBE®, by Programart Corporation. And it's helping companies improve mission-critical application performance by as much as 50%.

STROBE can quickly examine any MVS application, and has optional features for CICS, IMS, DB2, and other subsystems. The resulting information allows you to substantially reduce response time and to greatly improve batch processing schedules.

STROBE can even tell you the specific line of code that's causing the problem.

The result: you get higher performing applications everywhere in your company, from on-line transactions to overnight batch runs. That helps your people work more productively. Lets you reallocate resources to service new applications. And allows STROBE to pay for itself in a matter of months.

Call 617-661-3020, or send the coupon for our free White Paper, "Implementing an Application Tuning Policy." With STROBE, you don't have to just think about application performance. You can do something about it.

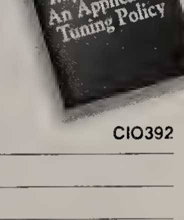
STROBE
BY PROGRAMART CORPORATION

FREE WHITE PAPER

☐ Please send me a copy of "Implementing an Application Tuning Policy" and case histories describing how STROBE has improved application performance.

☐ Tell me about STROBE seminars in my area.

☐ Have a representative contact me immediately.

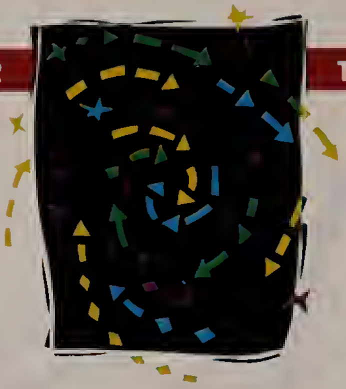


CIO392

Name ________________
Title ________________
Company ________________
Address ________________
City ________________
State ________ ZIP ________
Telephone ________________

Mail to: Programart Corporation, 124 Mt. Auburn, Cambridge, MA 02138. Or fax to: (617) 868-6069

© 1991. STROBE is a registered trademark of Programart Corporation. IBM, CICS, MVS, IMS and DB2 are registered trademarks of International Business Machines Corporation.



LEVERAGING TOOLS

A Promising Harvest

The days of slim pickings are gone as vendors cultivate a burgeoning crop of distributed-computing tools

BY RICHARD PASTORE

As spring draws near, the field of distributed-computing software tools has finally begun to bud. In the absence of major vendors, small entrepreneurial firms and traditional database players are vying for recognition in a blossoming application-development tools market. As for client/server management and conversion tools, a few packages are poking through the permafrost of what was once a vast product wasteland.

Though it's hardly a bumper crop, the pickings are improving among packaged application-development tools for distributed computing. "Eighteen months ago the selection was slim," said Frank Michnoff, program director of desktop computing strategies at the Meta Group in Westport, Conn. "Now the problem is weeding through all the tools."

Targeted toward either the professional developer or end user, most of these development tools make use of Structured Query Language (SQL) to access data from multivendor databases. Many run under Microsoft Corp.'s Windows, though several support OS/2. Their arrival spares a lot of Cobol programmers and users the angst of learning the fourth-generation languages required for hand-coding client/server applications.

"We've been using the C language, but we'd like to get away from that for our power users," said Paul Dunton, product planning group leader for office computing at Pacific Gas & Electric in San Francisco. "We don't want to force our people to become C programmers."

The most rudimentary front-end products are more suited to end-user data access and reporting than to application development (see "Helping Users Program," *CIO,* February 1992). Part executive information system, part data manipulator, Channel Computing Inc.'s Forest & Trees can be programmed to grab data from multiple back-end databases and display or manipulate it on demand. Other end-user tools include Quest from Gupta and Oracle Card from Oracle. One thing a user typically cannot do with these tools is update the data at the source. This limitation is by design.

"We designed Forest & Trees as a read-only tool so IS can maintain the integrity of the database but give users the access they want," explained Mark Klein, chairman of Channel.

ILLUSTRATION BY ROBIN JAREAUX

More-robust development tools are targeted at professional application developers. Among the most innovative or successful tools, analysts say, are PowerBuilder from Powersoft Corp., SQLWindows from Gupta, and Ellipse from Cooperative Solutions Inc. With these packages, developers can create applications that offload processing to the client and access data from a wide variety of databases.

Some of these tools automate much of the coding, leaving programmers to "sketch" applications with interactive graphical tools or objects. This results in quicker design.

Ellipse user Moog Automotive Inc. in St. Louis can crank out 30 screens in a day and a half. "Nothing for a mainframe environment can come close to that," declared Moog's vice president of MIS, Terry Smith.

Screen development on Codman & Shurtleff's old Wang Laboratories Inc. VS system averaged two hours per screen. Using PowerBuilder, the company cut that rate down to 15 minutes, according to Al Harrington, senior systems analyst at the Johnson & Johnson subsidiary in Randolph, Mass.

The makers of Forest & Trees, Ellipse and other packages aren't exactly household names—the companies were founded in the late 1980s. That's a concern for some CIOs who plan to develop mission-critical applications for client/server. "Though the tools look good and probably work well, our management is not willing to bet the company on new applications developed with untested tools," said John Ahrens, manager of manufacturing information systems at mainframe-maker Amdahl Corp. in Sunnyvale, Calif. "It's a tough situation in which to make decisions."

To minimize risk, users might try piloting the tools on noncritical projects, but ones visible enough to gain senior executives' sponsorship.

RAM Mobile Data and

What? Find a cus in a green Buick b leaves in 15 minu

National Car Rental® Thanks to RAM Mobile Data's revolutionary wireless data communications service, missing briefcases and the cars they're left in can now be found instantly. That's why National Car Rental uses RAM's mobile data service to track over 120,000 vehicles, improve vehicle maintenance management, provide better customer service, and cut costs.

Like what you hear? Then let us show you how mobile data can transform your company. With a laptop or portable computer and RAM's wireless, radio-based network, your field personnel can place orders, initiate billing, and check inventory whenever, wherever they need to. The RAM service will give your employees the ability to send and receive messages instantaneously – no matter where they are.

These are just several of the reasons why National chose RAM. Give us a call at 1-800-736-9666 and find out why RAM Mobile Data is the open road to data.™

RAM Mobile Data, One Rockefeller Plaza, Suite 1600, New York, NY 10020.

RAM Mobile Data is a joint venture of BellSouth Enterprises and RAM Broadcasting Corporation.

RAM MOBILE DATA

ational Car Rental

tomer's briefcase
efore his plane
tes?

To minimize risk, users might try piloting the tools on noncritical projects, but ones visible enough to gain senior executives' sponsorship. Even if the tool passes the test, "the tool you select today may not be the one you want two or three years from now," said Jerry Grochow, vice president at American Management Systems Inc. in Arlington, Va. IS executives should try to develop applications that have a high degree of functional isolation, he advised, so it won't be necessary to scrap it all when switching development tools.

While products from established players may be a safer bet, such firms carry more baggage than the new tools-only vendors. "They have to support a lot of old systems in their installed base," which may limit their capacity for innovation, said Moog's Smith.

The following are other key considerations in choosing a development tool, according to Anthony Picardi, director of software research at International Data Corp. in Framingham, Mass.:

- ▶ Look for the same features one would expect in a minicomputer or mainframe environment—record-level locking and referential integrity, for example.
- ▶ Seek a tool that leverages programmers' current language expertise, not one that forces them to learn a new coding language. Better yet, find one that features graphical user interface programming objects and generates code automatically.
- ▶ Choose a tool that can transparently access SQL-type data. Avoid those that require developers or users to learn multiple varieties of SQL.

Unlike development tools, products that aid the conversion from centralized to distributed or client/server computing remain relatively sparse. There are several front-end tools, such as Easel Corp.'s Easel, that strip away unsightly dumb-terminal user interfaces and repaint them as glorious graphical user interfaces. But these are little help in offloading processing from the host or converting data for use by new platforms.

"Ideally we'd like tools to do 100 percent of the job without losing any data," said Len Miller, CIO and vice president of Personal Insurance at the Metropolitan Life Insurance Co. in New York. Since nothing was available when MetLife went searching over a year ago, in-house programmers spent a year doing their own conversion software to translate data from a proprietary environment to an open distributed architecture using 13,000 laptops.

Users of SAS Institute Inc.'s software suite might have an easier time of it. Because SAS's C-language coding is portable, applications written with SAS tools for the mainframe can be segmented and distributed among hosts and clients "without having to do an extensive rewrite," said Barrett Joyner, SAS director of U.S. sales and marketing in Cary, N.C.

But for most folks, there's really no quick way around the need to re-engineer most applications and databases for conversion to client/server, analysts say. Some vendors, such as Bachman Information Systems Inc. in Cambridge, Mass., offer tools that help re-engineer databases. But there is nothing to help rework processes or applications, according to Jeff Tash, president of Database Decisions, a consultancy in Waltham, Mass.

In the management category, packaged

A Few Goliaths Heard From

The hottest products still come from small vendors, but some of the majors are joining the fray

As with other emerging markets, distributed-computing tools are not dominated by the traditional vendor powerhouses. Rather, the hottest products, with names like Forest & Trees and PowerBuilder, come from more entrepreneurial players. "These tools grew up because the major vendors are not offering products that are low cost, quickly installed and easy to use," said Neal Hill, senior analyst for the software strategy service at Forrester Research Inc. in Cambridge, Mass. "The major vendors have more of a host or mainframe-based mentality."

IBM's Information Warehouse, whose goal is to enable universal data access, is still incomplete, Hill said. Digital Equipment Corp., with its open systems embrace, is moving in the right direction for client/server, he added. Digital already markets a management tool, License Management Facility, that monitors and enforces proper software-license and -version usage over a distributed VMS or Ultrix environment.

Among the major software houses, Oracle Corp. is probably the biggest player to join the distributed-tools market, with several products based on its back-end database. Computer Associates International Inc. is now pitching its CA-Datacom and CA-IDMS products at the client/server market, including tools for end-user query access and PC-based applications development.

–R. Pastore

tools are only now beginning to crop up. Even so, managing the distributed environment remains the sourest grape on the client/server vine.

"Where client/server falls apart is on the management side. Vendors have not been aggressive in their timing" of bringing products to market, said Charles Mayer, managing director and CIO at First Boston Corp. in New York. Mayer has supplemented inhouse development efforts by availing himself of public-domain products from universities, including a Unix-based security and control offering from the Massachusetts Institute of Technology in Cambridge, Mass.

The scarcity of tools has forced IS to devise its own less-than-ideal management schemes. To ensure correct-version usage, MetLife has placed a "time bomb" in its remote users' software, Miller said. "If they don't use the right version, it stops working." MetLife has another homegrown scheme to enforce remote-user backups. "After a user skips doing backup for three consecutive days, all he gets on his screen is the backup menu," Miller said.

Many CIOs would wish for a single packaged management tool encompassing all the

The Client/Server Toolbox

*Some of the leading client/server tool vendors and their products (excluding CASE)**

COMPANY	PRODUCT/DESCRIPTION
Borland International Inc. Scotts Valley, Calif. 408 438-8400	**ObjectVision** End user's application builder **Paradox SQL Link** Professional's application builder
Channel Computing Inc. Newmarket, N.H. 800 289-0053	**Forest & Trees** End user's data-access tool
Computer Associates International Inc. Garden City, N.Y 516 227-3300	**CA-Datacom** Professional's application builder **CA-IDMS** Professional's application builder
Cooperative Solutions Inc. San Jose, Calif. 408 377-0300	**Ellipse** Professional's application builder
Easel Corp. Burlington, Mass. 617 221-2100	**Easel** Professional's front-end interface builder
Guidance Technologies Inc. Pittsburgh 412 231-1300	**Choreographer** Professional's application builder
Gupta Technologies Inc. Menlo Park, Calif. 800 876-3267	**SQLWindows** Professional's application builder **Quest** End user's data-access tool
Intelligent Environments Inc. Tewksbury, Mass. 508 640-1080	**Application Manager** Professional's application builder
Lotus Development Corp. Cambridge, Mass. 617 577-8500	**1-2-3 with DataLens** End user's data-access tool
Mozart Systems Corp. Burlingham, Calif. 415 340-1588	**Mozart** Professional's interface and application builder
Multisoft Inc. Lawrenceville, N.J. 609 896-4100	**InFront** Professional's interface builder
Oracle Corp. Redwood Shores, Calif. 800 345-3267	**Oracle Card** End user's application builder **Oracle for Windows** End user's data-access tool
Pilot Executive Software Inc. Boston 617 350-7035	**LightShip** End user's data-access tool
Powersoft Corp. Burlington, Mass. 800 635-2567	**PowerBuilder** Professional's application builder (also available from D&B Software, 508 370-5000)
Syscorp International Austin, Texas 512 338-5800	**MicroSTEP** Professional's application builder
Trifox Inc. San Mateo, Calif. 800 835-8746	**TRIMtools** Professional's application builder
Uniface Corp. Alameda, Calif. 510 748-6145	**Uniface** Professional's application builder
Viewpoint Systems San Mateo, Calif. 415 578-1591	**Flashpoint** Professional's interface and application builder

**Source: Forrester Research Inc., Cambridge, Mass.*

It's Been Open For Years.
It's A Lot Like

There are few things in this life that are more dependable than a computer from Sequoia Systems.

In fact, only Sequoia always gives you the flexibility of open systems and the reliability of fault tolerance in the same package. It's a package ideally suited to your business's high-performance on-line transaction processing.

Sequoia's open system allows you to take advantage of the latest technologies, and makes it easier for you to operate successfully in a multi-vendor environment.

Sequoia's unique method of achieving fault tolerance ensures constant availability to your on-line business applications, plus integrity of your data. And it also provides on-line service, with constant monitoring that can actually anticipate and prevent costly system downtime.

A symmetrical multi-processor architecture gives you the high performance necessary to handle complex OLTP applications, and to support a large number of simultaneous users.

Then as your number of users grows, your Sequoia system

© 1991 Sequoia Systems, Inc., 400 Nickerson Road, Marlborough, MA 01752. Sequoia is a registered trademark of Sequoia Systems Inc.

It Operates 24 Hours A Day.
Our Computers.

grows right with them – all the way to several thousand stations. This growth is modular, so you only purchase what you need, when you need it. And this expansion always happens while you're on-line.

Now, if you think all this sounds expensive, bear in mind that Sequoia shares another characteristic with the classic diner: our products are always an excellent value.

For a copy of our latest audited performance benchmark report, call 1-800-562-0011 (in MA 800-245-4033). Contact us today. Because when you hear what we have to say, we think you'll eat it up.

SEQUOIA
Open Systems. Continuous Availability.

1992 CIO SOFTWARE SURVEY

Use of Distributed Software

SOURCE OF SOFTWARE	SMALL TO MIDSIZED COMPANIES*	LARGE COMPANIES**
Company has purchased off-the-shelf distributed software	40%	58%
A third party has modified or developed distributed software for the company	40	39
IS organization has modified existing software to run in a distributed environment	33	72
IS organization has developed new software for a distributed environment	60	67

**Under $1 billion: 30 respondents* ***Over $1 billion: 36 respondents*

1992 CIO SOFTWARE SURVEY

Use of Distributed Development Tools

SOURCE OF SOFTWARE	SMALL TO MIDSIZED COMPANIES*	LARGE COMPANIES**
Company has purchased off-the-shelf development tools for distributed software	33%	61%
A third party has modified or created development tools for distributed software	13	19
IS organization has modified existing development tools for distributed software	7	42
IS organization has created new development tools for distributed software	7	31

**Under $1 billion: 30 respondents* ***Over $1 billion: 36 respondents*

components of a client/server environment—routers, cabling, servers, databases and applications. Analysts say tools should also automate the following management tasks: inventory management, configuration management, software distribution, software-version tracking, security, backup and archiving, documentation, system-capacity evaluation, usage reporting, diagnostics and performance monitoring and tuning.

None of the few packaged management tools available covers all of the above points. Ellipse includes tools that handle security, version tracking, user authorizations and automatic distribution of applications between client and server in online transaction-processing environments, according to company President and CEO Dennis McEvoy.

Annatek Systems Inc. in Boulder, Colo., has marketed its Network Navigator tools since the mid-1980s. The series includes products that automate software distribution, data distribution and collection, configuration management, remote support and scheduling in DOS and OS/2 client/server environments.

Legent Corp. of Vienna, Va., leaped into the management-tool market last fall, offering DOS-, OS/2- and Windows-based tools that automate cross-platform software management and predict and manage system capacity.

The very nature of distributed computing creates the need for automated remote management of data and applications. "What developers want is remote access to those databases in the field, where you often have no systems professionals," said Robert Zurek, client/server consultant at Infinity Systems Corp. in Glastonbury, Conn. Techsmith Corp. of Okemos, Mich., sells a transparent connectivity tool called RemoteNB that extends IS's reach to remote client/server installations. With it, users reportedly can dial up and send SQL data-access codes to a remote network workstation. The processing takes place on hardware at the caller's site, not at the remote location.

What does the near future hold for packaged distributed-computing tools? For one thing, more major industry players will join the market, including vendors of CASE tools. Andersen Consulting in Chicago has already adapted its Foundation CASE tools for client/server, as has Intersolv Inc. in Rockville, Md. More major players will also unveil management tools, particularly software-distribution managers.

The tools themselves will shift toward more of an object-oriented approach, according to consultant Zurek. They will make more intelligent use of data dictionaries old and new, and will begin supporting pen-based computing and multimedia.

Not counting expenditures on management and CASE tools, U.S. companies will pour $450 million into the market by the year 1995, according to Forrester Research Inc. in Cambridge, Mass. Compare that with last year's $60 million market, and it's apparent this industry's getting ready to bloom.

CIO
A Brave New World For Tomorrow's CIOs
Our Annual Study On Today's CIOs

The basic one-year subscription rate for *CIO* magazine is $94.

Subscribe And Save. $~~94~~* $59

Yes, enter my one-year subscription to *CIO* magazine and bill me later for only $59, a savings of over 50% off the cover price.

Name ______________________

Title ______________________

Company ______________________

Address ______________________

____

City ______________ State ______ Zip ______

**This is a domestic rate only (Canada & US). The foreign rate is $175 US.*

392

PROCESS
IMMEDIATELY

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 1020 FRAMINGHAM, MA

POSTAGE WILL BE PAID BY ADDRESSEE

CIO Magazine
Attn: Circulation Department
P.O. Box 9208
Framingham, MA 01701-9900

They're very different companies. But they all share the same competitive edge.

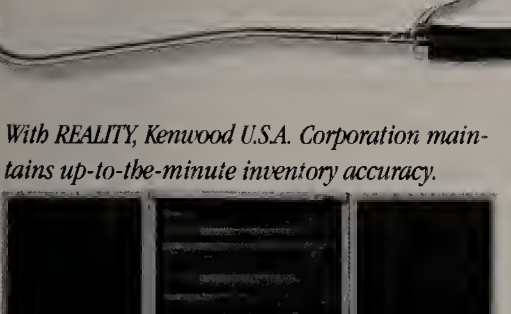
REALITY gives Texas Meridian Resources up-to-the-minute well analysis and oil and gas revenue checks.

Richardson Electronics uses REALITY from 28 locations worldwide for same-day shipment of orders for Electron Tubes.

With the help of REALITY, the Rockport Company turns around customer orders within 24 hours.

Bell Atlantic's Revenue Accounting is online with REALITY to ensure accurate customer bills.

Marion General Hospital uses REALITY to access real-time patient information.



With REALITY, Kenwood U.S.A. Corporation maintains up-to-the-minute inventory accuracy.

Contempo Casuals tracks the hottest fashion merchandise in 260 stores with online connections to REALITY.

That's because these leading companies have one thing in common. They all run on REALITY,® Novadyne's easy-to-use, "real-time" database management system. REALITY lets them choose from among the 4,000 proven applications developed for different kinds of businesses.

For more than two decades, in more than 7,000 installations, Novadyne has delivered solutions to companies who can't wait for answers.

And we deliver the total package. From proven McDonnell Douglas® and SUN®/RISC hardware technology with UNIX,® to software, networking design, installation, training, support and our own nationwide field service offices in 125 locations.

To learn more about how Novadyne can give your company the competitive edge, contact us today at 1700 East St. Andrew Place, Santa Ana, California 92705-6560, **(800) 876-6823.**

We're more than a computer company. We're your valuable business partner.

NOVADYNE™
COMPUTER SYSTEMS, INC.

Bringing a New REALITY® to Business.

All trade names referenced are the service marks, trademarks or registered trademarks of their respective manufacturers. ©Copyright 1991. Novadyne Computer Systems, Inc. All rights reserved.

CONTROLLING COSTS

Systems On A Shoestring

CIOs are devising some creative schemes for getting more mileage out of limited software budgets

BY THOMAS KIELY

Software costs are a bear to manage, but CIOs are trying hard. IS executives say they are cutting software costs by purchasing more off-the-shelf software, cutting staff and outsourcing development. They are negotiating aggressively with vendors to get breaks on software sticker prices and maintenance fees. At the same time, they are continuing to move applications from bigger processors to smaller ones, and to employ CASE tools or fourth-generation languages. But some companies report that they are also simply making do with less software altogether.

Software is still a runaway train in many IS departments. According to the most recent IS management survey conducted by CSC/Index, of Cambridge, Mass., IS budgets will grow an anemic 3.5 percent in 1992. Yet consultants note that IS departments' software expenses are rising anywhere from 3 to 20 percent, depending upon the size of the department, the mix of platforms and development initiatives, and other factors.

Many CIOs interviewed for this article couldn't give a hard number for the uptick in their software budgets, often because they have nixed any uptick by cutting back. Still, when asked by *CIO* to comment on the factors driving up software costs in their shops, they cited the cost of developing and maintaining software in-house and the increased fees associated with packaged software—the same issues they cited in last year's *CIO* software survey (see chart, Page 68).

Asked to rank their strategies for holding software costs down, over 90 percent of this year's respondents—whether from big companies or small—said they purchase packaged software. "We're trying to buy rather than make," said Gregory McHugh, director of IS at Analog Devices, in Nor-

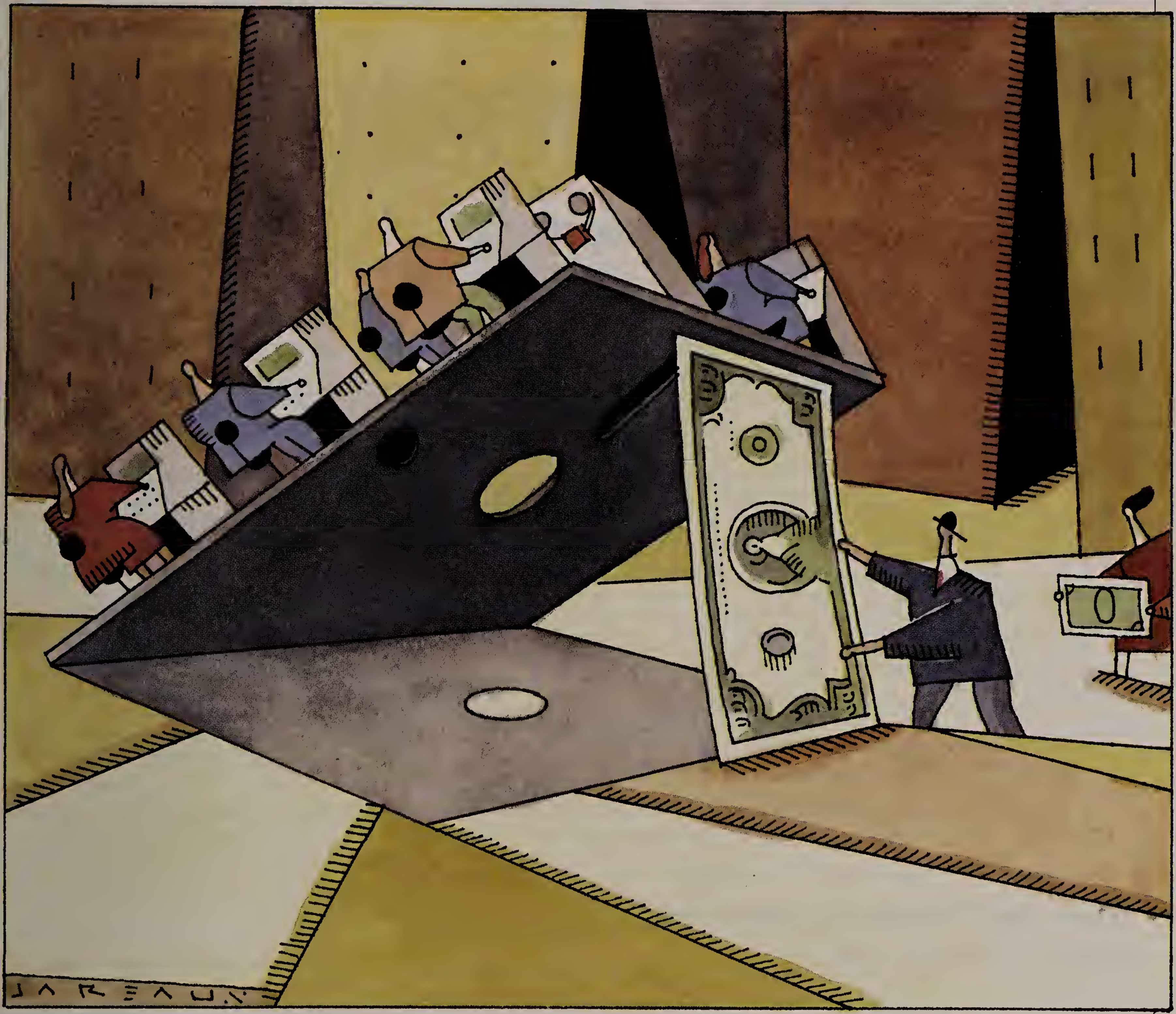


ILLUSTRATION BY ROBIN JAREAUX

wood, Mass. "It's much cheaper."

But buying has its own bundle of headaches. First of all, IS executives complain, software fees continue to rise—especially for mainframe software. Some big-systems software vendors raise their base prices for products every year, according to several survey respondents. And with the base price going up, maintenance and support fees rise each year, too, like a variable-rate mortgage from hell.

"We're evaluating a proposal [that would convert] monthly support charges for a whole group of [mainframe] software into a yearly commitment—and to fix that at today's dollars," said Gerald Quaid, director of IS at Northern Indiana Public Service Co. "That will give us the opportunity to increase our software base by up to 10 percent without increasing our costs this year." Quaid is in the process of buying another mainframe, so he has some leverage with his vendor.

Other IS executives are trying to negotiate caps on maintenance fees, signing perpetual license agreements (for systems software they foresee using for years to come) or driving hard bargains for support fees or tier licensing arrangements. "We've gone so far as to discontinue [some] maintenance agreements," said Colin Hulin, second vice president of EDP Systems at Pan American Life, in New Orleans. Pan American axed maintenance contracts considered too costly (and providing little for the price) or for software packages that were substantially customized in-house.

On the other hand, GTE Data Services, headquartered in Temple Terrace, Fla., has centralized support for its four data centers at a single site. The central support site pays full shot for its own support fees, but the other data centers receive discounts

> **"We're trying to buy rather than make. It's much cheaper."**
>
> *–Gregory McHugh*

from vendors for support services funneled through the central site. GTE estimates that it has reduced its support charges by 30 to 50 percent. GTE also tries to bundle next year's planned software purchases into this year's buy. For example, if it intends to purchase 6,000 copies of a product this year and knows it will purchase an additional 4,000 copies in 1993, GTE will buy all 10,000 copies in 1992—for a bigger discount, and at 1992 prices.

1992 CIO SOFTWARE SURVEY

Major Cost Drivers for Large Companies*

COST FACTOR	VERY SIGNIFICANT	SIGNIFICANT	INSIGNIFICANT
In-house development	49%	40%	11%
Maintenance to fix bugs and satisfy previously stated requirements	49	40	11
Maintenance to add functionality	43	51	6
License fees	42	49	9
Customizing purchased software	38	34	28
Availability of site licenses	36	43	21
Deployment of staff in operating departments	23	32	45
End-user purchasing	18	40	42
License-transfer fees passed on from outsourcing vendors	6	17	77

**Over $1 billion: 53 respondents*

Major Cost Drivers for Small and Midsized Companies*

COST FACTOR	VERY SIGNIFICANT	SIGNIFICANT	INSIGNIFICANT
License fees	58%	27%	15%
In-house development	49	35	16
Maintenance to add functionality	44	40	16
Maintenance to fix bugs and satisfy previously stated requirements	38	31	31
Customizing purchased software	38	22	40
Availability of site licenses	33	20	47
End-user purchasing	11	42	47
Deployment of staff in operating departments	4	27	58**
License-transfer fees passed on from outsourcing vendors	2	11	67***

**Under $1 billion: 45 respondents*

***11% said not applicable*
****20% said not applicable*

Analog Devices saves money by shopping in Europe. "We try to buy European software rather than American whenever possible," said McHugh. "It's higher quality at a lower cost." European packages sport features that are important to Analog and are usually lacking in American products—such as multilingual and multicultural capabilities. McHugh also saves money by declining to purchase source code. If Analog doesn't intend to make substantial modifications to the package, they will ask the vendor to put the code in escrow (in case the company goes out of business) and take a price break. (See "Support Groups," *CIO,* February 1992.)

Among the respondents to CIO's survey, 53 percent of the large companies and 38 percent of the smaller ones are reducing the size of their development staffs to cut costs.

But some companies are simply buying less software. At GTE Data Services, all requests to purchase software need the approval of the Productivity Consistency Review Board, which is made up of managers, not technical staff. End users must make a business case for the purchase. The tough stand has helped the company to standardize—and to reduce the amount of software it purchases. Several other IS executives also said they are purchasing less software. One CIO noted that users don't really need the functionality touted in the latest releases of several new PC software products.

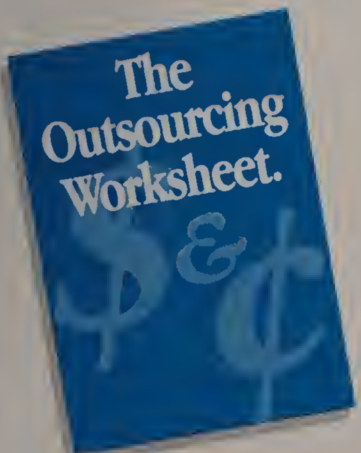
Many companies are also saving money by customizing purchased software less often. Gerry Ritchhart, director of information management at Holy Cross Health Systems in South Bend, Ind., said her department tries to convince end users in the compa-

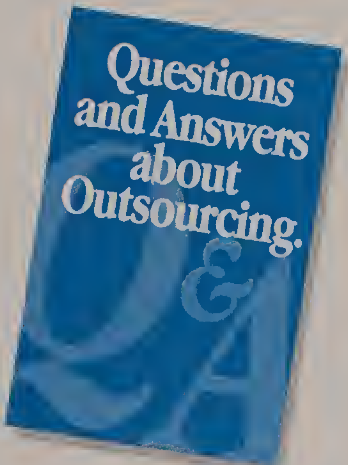
The Truth About Outsourcing.

When you first look at outsourcing, you may think it's cheaper to manage your own data network. But be careful. Beneath the base costs of leased lines, there are many hidden costs associated with doing it yourself. Costs like employee expense, equipment maintenance fees, depreciation and rental charges, network management software and datacom staff training. Just to name a few. When you add it up, doing it yourself isn't such an inexpensive idea.

Outsourcing with Cylix eliminates the unknowns of managing your own data network. Not to mention the cost of wasted time when something goes wrong and the phone company and equipment vendors give you the runaround.

With Cylix, you don't have those problems, because we manage your data network for you. We order, install, manage and maintain all modems, DSUs/CSUs, and leased lines. We provide a minimum 99.5% network availability and an average Mean Time To Repair of under four hours. All for one monthly fee that will save you at least 10% on the operating costs of trying to do it yourself. Figure out for yourself how much you can save by outsourcing with Cylix. Get *The Outsourcing Worksheet* and *Questions and Answers about Outsourcing* by calling 1-800-234-2954.





Cylix® COMMUNICATIONS CORPORATION

The Data Network Experts.

FCR A subsidiary of France Câbles & Radio

800 Ridge Lake Boulevard, Memphis, TN 38120-9404 Phone 901-761-1177

©1992 Cylix Communications Corporation

With the base price for some big-system software going up every year, maintenance and support fees rise, too, like a variable-rate mortgage from hell.

ny's 12 hospitals that customized functionality is expensive. But end users are sometimes adamant, so Ritchhart is now trying to work out joint-development deals with a few vendors. She hopes to shave her development costs through partnerships.

Development costs are largely people costs. Among the respondents to *CIO*'s survey, 53 percent of the large companies and 38 percent of the smaller ones are reducing the size of their development staffs to cut costs. To put these costs in context, consider the figures cited by Howard Rubin, a software consultant in Pound Ridge, N.Y., and Edward Perlin, a management consultant in New York. In 1980, a software maintenance employee earned an average salary of $25,040 and maintained about 8,000 lines of code a year. Today, that employee earns an average salary of $44,880 and, with the help of many new software tools, can maintain 80,000 to 100,000 lines of code.

In contrast, software developers earned an average salary of $26,310 in 1980 and could write about 5,000 lines a year. Today, developers command an average salary of $46,850 and write about 7,500 lines a year. As a unit of cost, it is more expensive to build than to maintain. On the other hand, while having fewer developers under the roof may save money, it also means less software. Outsourcing software development is one strategy to balance cuts against new development—but our survey indicates that this strategy is more popular among larger companies than smaller ones (see chart, Page 72). Several companies, including the Kansas City Power and Light Co., outsourced development of new applications to professional firms. "That kept me from having to beef up my staff," explained Ken

Bargaining Chips

Here are a few tips to help CIOs improve their position at the negotiating table

"CIOs give away their negotiating points [to vendors]," observed Joe Auer, president of International Computer Negotiations Inc., a consultancy based in Winter Park, Fla. When buying important software, many CIOs follow a well-worn path: They evaluate vendors, select one, inform all the vendors of the decision, inform the organization of the decision, and then sit down to negotiate a deal. "If [CIOs] then say they want to optimize their deal and lower their costs, it's too late. All they can do is beg."

Negotiating a buy is a process, Auer believes, not an event. "It has to be viewed as a process from the time the [vendor's] salesperson walks in the door." Auer recommends that CIOs form acquisition teams and carefully plan and evaluate an acquisition methodology before sending out requests for proposals.

If the vendor installs product on a trial run, first negotiate a permanent contract (including price), contingent upon a satisfactory trial. This way, if the end users don't like it, they can pitch it; but if users love it, the CIO hasn't lost negotiating strength.

Get everything in writing; don't fall for, "We can't put that in the contract because of government auditing problems, but trust me, we will take care of it." Also, don't fall for warnings that a price increase is coming. Everything is negotiable.

Tobey Marzouk, a computer-law attorney with the firm of Marzouk & Parry in Washington, urges his clients to negotiate license fees and maintenance fees at the same time—not separately. If they're not paying attention, CIOs will give back to the vendor in the maintenance agreement everything they have won in initial price breaks. "[And] the vendor will sometimes make a lot more concessions in the maintenance agreement to get the license agreement signed," he said. Payment schedules, installation costs and training fees are also negotiable. And CIOs should try to use the RFP to get à la carte items folded into the base price.

–T. Kiely

THE ASSOCIATION FOR COMPUTING MACHINERY PROUDLY PRESENTS

THE COMPUTER MUSEUM'S 1992 COMPUTER BOWL

FRIDAY MAY 1, 1992

THE HASSLE IN THE CASTLE

ANOTHER TECHNICAL KNOCKOUT

EAST vs WEST

CHARLIE
"JOHANN SEBASTIAN"
BACHMAN
Captain, Bachman Information Systems, Inc.

vs

JOHN F.
"FUTURE"
SHOCH
Captain, Asset Management Company

BILL **"THE ELBOW"**
MACHRONE
Ziff-Davis Publishing Company

VS

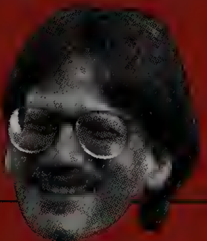
JEFF **"THE KILLER"**
KALB
MasPar Computer Corporation

DR. DAVID L. "HALF" **NELSON**
Fluent Machines Inc.

VS

RUTHANN
"THE MIGHTY" **QUINDLEN**
Alex. Brown & Sons

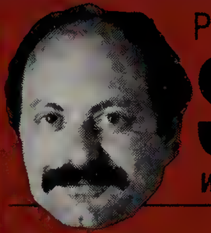
ANDY **"M.C."**
RAPPAPORT
The Technology Research Group, Inc.



VS

VERN **"THE ACE"**
RABURN
Slate Corporation

THE EXAMINER
BILL GATES
Microsoft Corporation



PAUL **"BEARER"**
SEVERINO
Wellfleet Communications, Inc.

VS

DR. JOHN E. **"KNOCK KNOCK"**
WARNOCK
Adobe Systems, Incorporated

LIVE SITE THE PARK PLAZA CASTLE
BOSTON, MASSACHUSETTS

The Computer Bowl

CLOSED CIRCUIT SITE **XEROX PALO ALTO RESEARCH CENTER, CALIFORNIA**

This is the rematch fans have been waiting for all year. Ever since the last action-packed Technical Knockout, the West has been clamoring for another go at the Champions from the East. On May 1, they'll get their chance to lace 'em up.

Join us at live at ringside or at the closed circuit site for all the blow by blow excitement of *The Hassle In The Castle* – The Computer Museum's 4th Annual Computer Bowl. It's sure to be *Another Technical Knockout*.

Presenter

The Association for Computing Machinery

Underwriters

Apple Computer, Inc.
Digital Equipment Corporation

Judges

Pamela McCorduck
Author

Heidi Roizen
T/Maker Company

Founders

Pat Collins Nelson &
Dr. David L. Nelson

Official Sponsors

Bank of Boston
The Bank

BASF Information Systems
The Diskette

Intel Corporation
The Microprocessor

MasPar Computer Corporation
The Massively Parallel ComputerCompany

Merrill, Pickard, Anderson & Eyre
The Venture Capital Firm

Price Waterhouse
The Accounting Firm

Radius Inc.
The Systems Enhancement Company

Robertson, Stephens & Co.
The Investment Bank

Stratus Computer, Inc.
The Transaction Processor

Visix Software Inc.
The High Performance Workstation Software Co.

Wellfleet Communications, Inc.
The Internetworking Company

Promotion

PARTNERS & Simons

The Computer Bowl is broadcast on the PBS series, Computer Chronicles, hosted by Stewart Cheifet. The Computer Bowl is a project to benefit the educational programs of The Computer Museum, 300 Congress St., Boston, MA 02210.

For tickets and sponsorship information 617-426-2800 ext. 346.

Engraving

HK Graphics

At GTE Data Services, all requests to purchase software need the approval of the Productivity Consistency Review Board, which is made up of managers, not technical staff. End users must make a business case for the purchase.

Wymore, vice president of MIS and communications at the Kansas City-based utility. Similarly, in Ernst & Young's 1991 survey on retail IT trends, cost control was cited as the most pressing issue facing retail-company IS heads, and 62 percent of the survey's respondents indicated that they were outsourcing (or planned to outsource)—a figure that included contract software development.

A significant amount of outsourcing is being done offshore. Nine percent of large companies surveyed have gone overseas for development services; countries mentioned include India, the Philippines and Ireland. Salaries for Irish programmers are said to be about half those of programmers on the East Coast of the United States, and the Irish government actively courts business, offering cash, tax breaks and a revamped national telecommunications system. Singapore, Malaysia and China also compete for the business of software development, offshore data entry, code conversion and coding from specifications.

Purchasing off-the-shelf software is by far the most popular method of controlling costs for all companies. Large companies are more likely to outsource software development projects than small or midsized organizations, and a significant amount of outsourcing is being done offshore.

1992 CIO SOFTWARE SURVEY

Cost-Reduction Methods

METHOD	SMALL TO MIDSIZED COMPANIES*	LARGE COMPANIES**
Purchasing off-the-shelf software	93%	91%
Using software-development tools	78	79
Moving production systems to less-expensive processors	62	58
Reducing size of development staff	38	53
Outsourcing development projects	29	45
Outsourcing maintenance	11	23
Having development done outside the United States	4	9

Under $1 billion: 45 respondents ***Over $1 billion: 53 respondents*

Many IS executives consider tools another cost-saving measure. Among survey respondents, 78 percent of the small companies and 79 percent of the larger companies reported that they are trying to hold down software costs by adopting productivity tools, including CASE and fourth-generation languages. A NYNEX development group near Boston has been using CASE tools for six years, reported the group's IS director, "and now we're gaining the benefit of it." The development group is also prototyping and employing reusable code to save money.

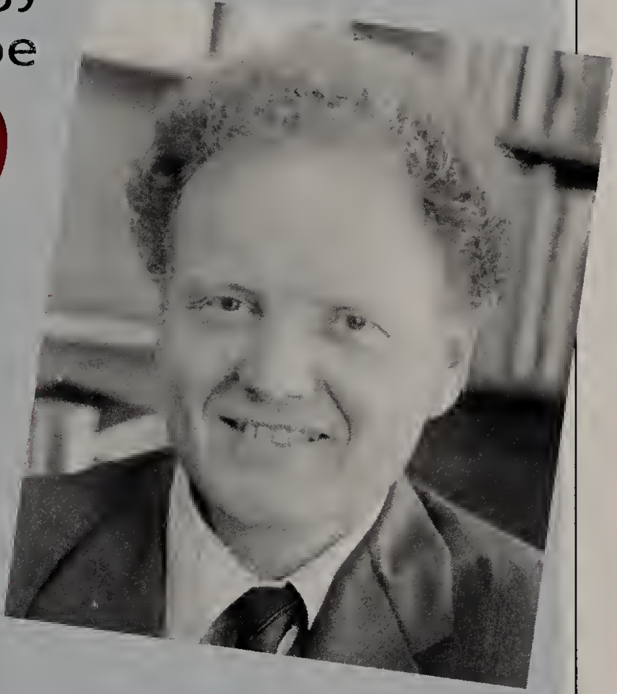
The Virginia Department of Rehabilitative Services is trying to keep up with user demand through a combination of tools and job flexibility. The department made the switch to a fourth-generation language (from Cognos Inc.) in 1987. Soon after, MIS Director Charles Weston trained his analysts to be programmers and his programmers to be analysts. "We can't entirely avoid specialization, but [with flexibility] we are more productive at less cost. We couldn't have done it in a third-generation language."

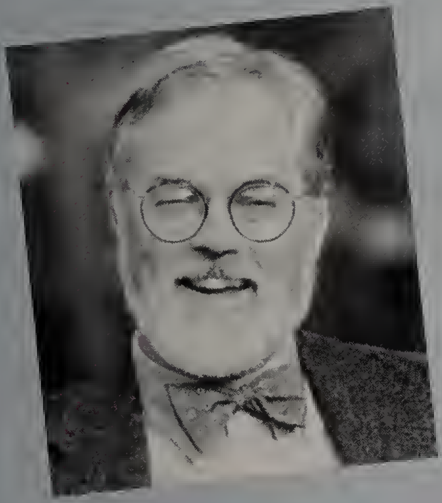
Finally, CIOs are continuing to shift systems to less expensive processors. A large West Coast manufacturer is moving all its manufacturing systems—including its MRP and inventory systems—from mainframes to minicomputers, workstations and servers. The overhead and associated costs of running these systems on the mainframe are currently about $7 million to $8 million a year, whereas the company estimates that the mini-based systems will slash costs to about $2.5 million a year. The migration, which they hope to complete in 1993, will cost between $3 million and $4 million.

However, there are always hidden costs in a migration, consultants warn. The company's IS director noted that training and education costs are higher than expected, and there have been some unanticipated expenses incurred in running two systems during the transition. In more intensely distributed systems, the hidden costs can run even higher—including communications outlays, consultant fees and associated re-engineering or retooling fees. "The hardware is cheaper, but essentially you have to rebuild the data center," consultant Rubin pointed out.

When it comes to trimming software expenses, there is no magic bullet, said Pan American's Hulin. "You have to use a variety of approaches." CIO

> “America must adjust its industrial practices to conform to those of the rest of the world. . . . Our skills, our plants and equipment, our technology and our management abilities have to be better than the rest of the world’s.”
>
> LESTER THUROW





> “Uh-oh!”
>
> ROBERT FULGHUM

THE CIO PERSPECTIVES SERIES^{sm}

The Process of IT: Organizing for Success

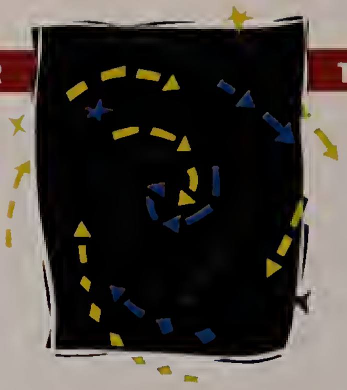
A three-day conference defining the components of successful information technology management: The infrastructure, technologies that impact business, and management and control issues.

Sunday, October 11 through Wednesday, October 14, 1992
Boca Raton Resort & Club ■ Boca Raton, Florida

For more information or to enroll,
call 800/366-0246

CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES



MANAGING PERSONNEL

The Human Factor

Building a top-notch staff in the era of distributed computing means rethinking those old human-resource strategies

BY KATHLEEN MELYMUKA

Often the missing piece in the distributed-computing puzzle is the people who know how to put it all together.

Studies indicate that nearly three-fourths of programmers lack the skills needed for new technologies. Nevertheless, 60 percent of IS executives surveyed by *CIO* said they are spending less than 2 percent of their budgets on training for software professionals (see chart, Page 79). If CIOs are to meet the needs of the immediate future, they have to change where they look and what they look for in new hires, revolutionize the way they think about training and create an environment that keeps people challenged and current.

The problem is clear. "Software development skills in Fortune 1,000 MIS [shops] are out of sync with corporate needs," states the September 1991 report "Recycling Programmers," from Forrester Research Inc., of Cambridge, Mass. The report went on to cite four areas where current IS staff members are particularly weak: application-development tools (including CASE), programming for client/server, relational and distributed databases and object-oriented technology.

Robert A. Zawacki, professor of management and international business at the University of Colorado, puts it this way: "The IS field has changed and the [required] competencies have changed, but the people haven't changed."

The first rule of coping with an outdated workforce is don't make things worse. "Don't hire any new people who don't fit the picture," advised Susan Falzon, associate director of PRISM (Partnership for Research in Information Systems Management), a joint research and advisory service of CSC/Index and Hammer and Co. in Cambridge, Mass. "We have to stop the proliferation of people with old skills."

CIOs must establish new hiring criteria, Falzon said. While up-to-date technical skills are important, "soft" skills—business acumen, interpersonal skills, the ability to work in teams, the ability to work in the context of ambiguity—may be even more crucial.

CIOs are unlikely to unearth people who match this profile by mining traditional sources. Vocational schools are out, and so are recruitment firms that rely on old programmer models. "Vocational-school hires with two years of technical training are the

ILLUSTRATION BY ROBIN JAREAUX

antithesis of what you're looking for," said James C. Wetherbe, director of the Management Information Systems Research Center at the University of Minnesota's Carlson School of Management in Minneapolis.

Instead, successful CIOs say universities have become the best source for new hires, provided you consider business and even liberal-arts majors as well as computer scientists. "A lot of our clients are hiring MBAs with a strong bent for technology," Falzon said.

In addition, a CIO's own company may prove a valuable source of new talent. A number of CIOs cited instances where they had found people with great potential in other departments. Let the word out that you're doing new and exciting things, they advised, and good candidates will come to you.

No matter where you go to find new employees, today's rapidly changing technology puts a premium on aptitude rather than experience. "You need people who can learn quickly rather than people who know how to do it," said Wetherbe. "You don't want to be hiring people a mile deep and an inch wide; you need breadth."

Jim Smallman, senior vice president of information services at Burlington Air Express of Tustin, Calif., has cut turnover from between 30 and 40 percent to less than 8 percent during his two and a half years' tenure. He credits his success to hiring candidates with the ability and motivation to grow into the job. "I like the idea of getting a sufficiently stable environment where I can hire more junior people and look for talent rather than experi-

> **"Vocational-school hires with two years of technical training are the antithesis of what you're looking for."**
>
> *–James C. Wetherbe*

AT&T Electronic Mail Services.

With AT&T Electronic Mail Services, you no longer have to rely upon the post office, faxes, messengers or interoffice mail to send a message. Instead, with the computer right on your desk, you can use Electronic Mail to connect with everyone you need to communicate with during your day. And you can do it faster, easier and more efficiently than you ever thought possible.

Since Electronic Mail moves information electronically, it's paperless. It's also easy to use—you just type a message, address it and push the send button. And that same button lets you send information to hundreds of recipients. And with our fax, telex and postal delivery options, they don't even need to have a computer. Nor are you limited to written messages; it's just as easy to send spreadsheets and computer files.

How to teach the computer on your desk to delive

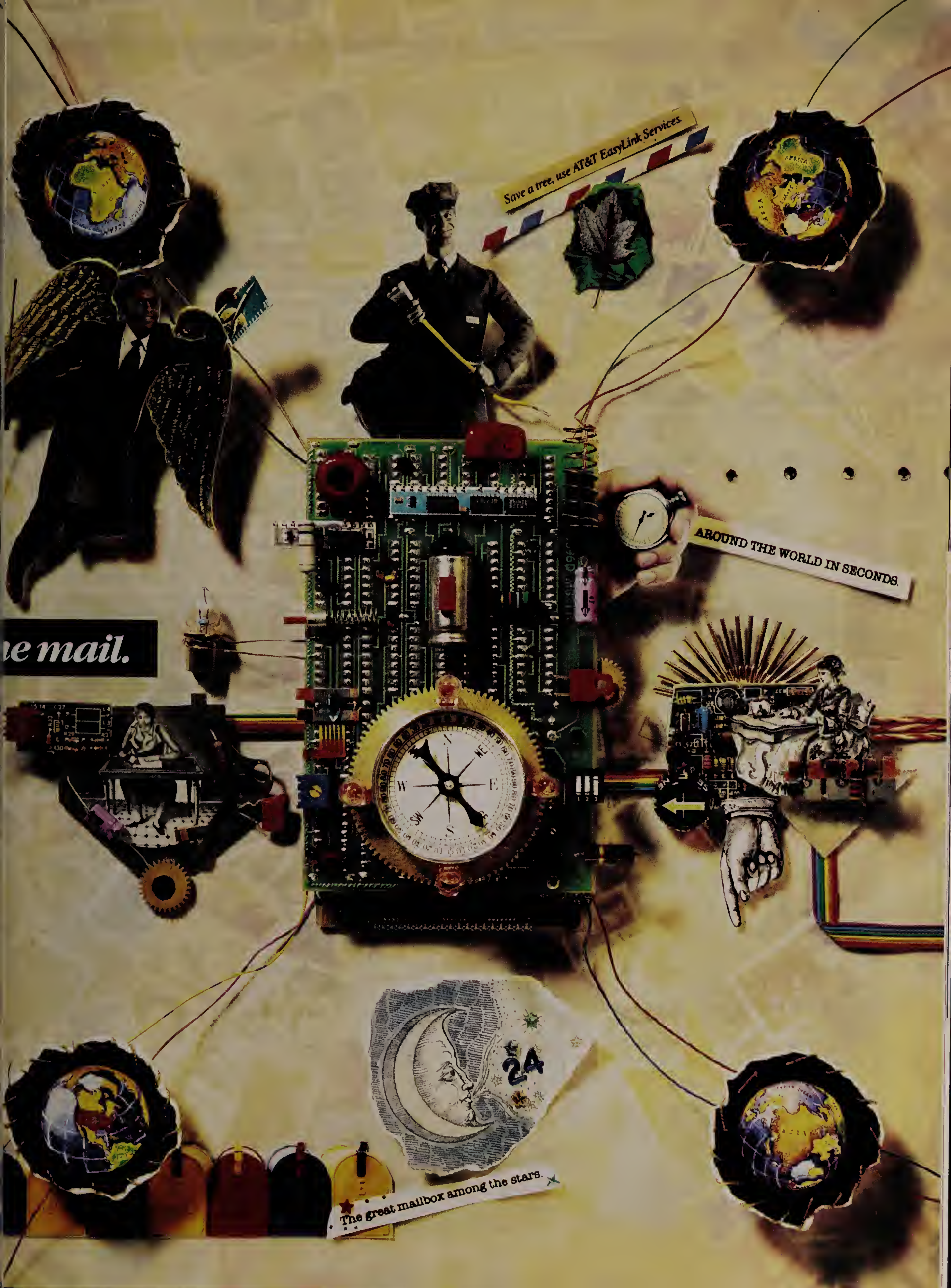
And with our access and delivery options, Electronic Mail is compatible with the communication systems you already own.

AT&T Electronic Mail Services is just one of the many electronic messaging solutions offered by AT&T EasyLink Services. Together they can answer all your global communication needs and help you *see, hear* and *say* things you never could before.

For more information on how AT&T EasyLink Services—the worldwide leader in electronic mail services—can deliver a mail service that is right for you, call your account representative or AT&T EasyLink Services at 1 800 242-6005, Dept. 6307.

© 1992 AT&T

AT&T
EasyLink Services


e mail.
Save a tree, use AT&T EasyLink Services.
AROUND THE WORLD IN SECONDS.
The great mailbox among the stars.
24

> **"I might hire someone to do mainframe Cobol programming, and before you know it he's writing Pascal on a PC. We're looking for people who can tackle things outside their job skills."**
>
> *–Curt Browne*

ence," he said.

Curt Browne, director of technical support services at Towers Perrin, an international business consultancy based in Philadelphia, stresses the importance of finding employees who are willing to learn and be flexible. "I might hire someone to do mainframe Cobol programming, and before you know it he's writing Pascal on a PC," Browne said. "We're looking for people who can tackle things outside their job skills."

Hiring the right people is the first step, but to keep them, you have to keep them challenged. *CIO*'s survey ranked the opportunity to work with leading-edge technologies as the most important factor in retaining valuable development and maintenance professionals (see chart, Page 80). "Even more than others, IS employees need to be constantly stretched and stimulated and to constantly learn new things," said Zawacki.

Ironically, the traditional IS structure has been antithetical to these needs. "The way we've carried out the roles of IS in the past 20 years has pulled out of the environment all the things that motivate people," Falzon said. "We've been so control-oriented and structure-oriented, we have removed opportunities for creativity and continuous learning."

If CIOs put new-skills people into old roles, Falzon said, nothing will change. "They can't just change the skills; they have to

People Pointers

Suggestions for building a winning team

In the past four years, Director of Corporate Information Services Peter Burrows has moved the Foxboro Company of Foxborough, Mass., from a mainframe batch shop to a distributed environment with more than 3,000 PCs, 100 workstations, 300 terminals and 60 servers worldwide—all while downsizing his department by more than 40 percent. Foxboro won the 1991 INTEROP Achievement Award for internetworking technology in manufacturing, and Burrows, who clearly knows what it takes to mold a winning team, suggested some characteristics of a successful human-resource strategy.

- **Develop** a clearly articulated vision and explain it frequently to employees.
- **Watch** for signs of overwork or unusual stress that can mean a project is in trouble. Step in to help and take some of the heat if necessary.
- **Conduct** a postmortem of every project and encourage employees to always tell you the bad news.
- **Encourage** interaction between your employees and the people they support.
- **Help** talented people reach career goals even if it means losing them.
- **Consider** existing staff's declared career goals before hiring from outside.
- **Use** industry-recognized job descriptions and titles.
- **Structure** job descriptions into families, and clarify the criteria for advancement within a family and the path to change families.
- **Never** make a superior technical person join the supervisors' ranks to get more pay.
- **Pay** particular attention to entry-level hires. Structure promotional opportunities with very aggressive salary steps in these early years.
- **Ask** employees what could make their lives better.
- **See** that employees get the training they need; make sure they have the best tools to do the job.
- **Bend** the rules if necessary when a good employee comes to you with a problem.
- **Find** ways, in addition to excellent pay, to recognize excellent performance.
- **Move** people around. Adjust the organization as business requirements dictate.
- **Promote** open discussion among peers.
- **Insist** on creativity. Demand more than one solution to any problem.
- **Encourage** those with special knowledge to share.
- **Involve** your best people in evaluating promising technology, even if it will not be directly useful in their current assignment.
- **Express** the urgency of a project, but avoid assigning a project-completion date yourself.
- **Have** some fun. Keep some humor in amidst the hard work.

–K. Melymuka

change the whole environment."

For example, you can't just say you want people to work with new tools and new technology; you have to make it happen. "If you say that in three years everything will be client/server, and if people see client/server being built, they get the message real quick," Falzon said. "There's something to be said for pulling the plug [on old technology]."

But that shouldn't mean writing off your current staff. Only 28 percent of IS employees possess the skills necessary to deal with new technologies, the Forrester report concluded. But more importantly, only 14 percent lack the ability or desire to make the transition from code-oriented mainframe programming to end-user-oriented new platforms. That leaves 58 percent of current IS staff who are retrainable, and that's too big a resource to waste.

> **"The way we've carried out the roles of IS in the past 20 years has pulled out of the environment all the things that motivate people. We have removed opportunities for creativity and continuous learning."**
>
> *–Susan Falzon*

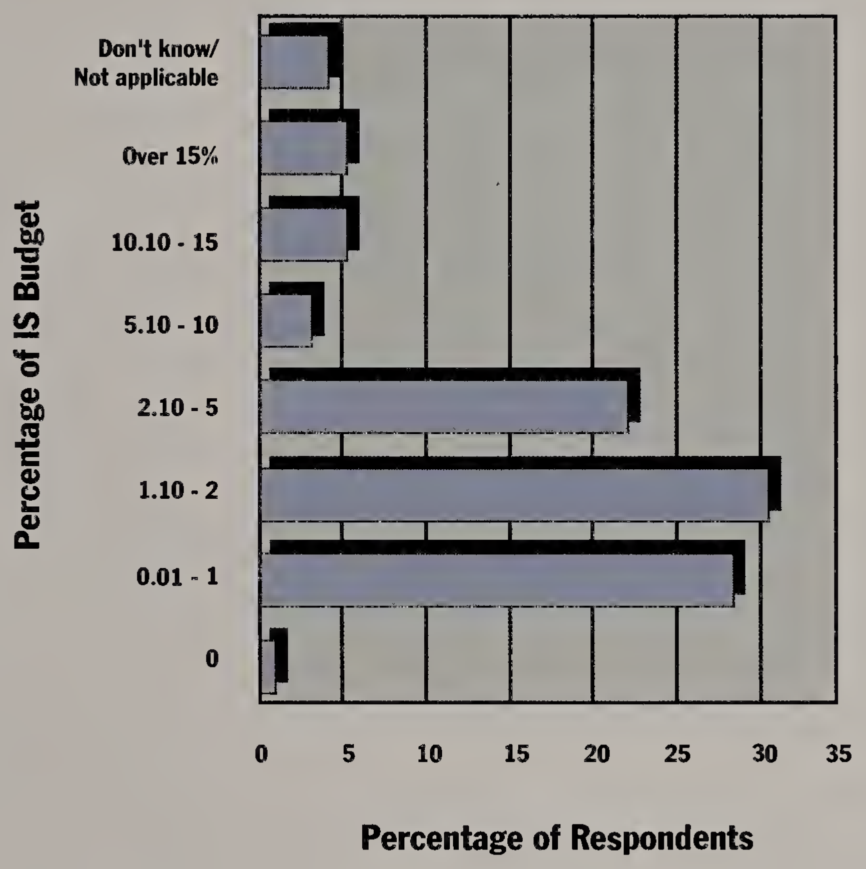
"We've been spending a lot of time, effort and money on retraining our existing staff," said Browne. "While they may not have the specific skills [needed for new applications], they have other qualities, and they understand the business aspects of things."

Because technology changes so rapidly, retraining must be treated as a continuous process rather than as a one-time event, and that dovetails nicely with the software professional's need for constant challenge. "You're going to have to plan on any IS professional spending 25 percent of his or her time keeping current," said Wetherbe. "You have to allocate time for that, or your knowledge base will erode over time."

"You have to give people the opportunity to come up to speed," said Falzon. Such opportunities may include on-the-job training, external education and the chance to interact with people working at the leading edge of technology. But for the most part, training should be developed in-house. (See "Inner Resources," Page 82, for a discussion of using internal staff to provide classroom training.) "Very few [outside courses] will cover the kinds of problems you have to solve," said Mario Barbacci, director of the Real-Time Distributed Systems program at the Software Engineering Institute at Carnegie Mellon University in Pittsburgh.

1992 CIO SOFTWARE SURVEY

Training Budgets* for Development and Maintenance Staff



*As percentage of overall IS budget Number of respondents: 93

Burlington's Smallman has found that internal training, though arduous for those who must develop and teach the courses, provides benefits to trainers as well as trainees. "It gives [trainers] an opportunity to really think through a process," he said.

Another approach to training involves teaming old-skills and new-skills people so that both types can share their strengths. In a recent development effort, Browne found this to be popular and effective. "People were climbing over each other to volunteer for it," he said. "Most didn't have the [most current] skills, but we could let them learn from the new hires."

Rotating jobs can also facilitate continuous learning. "We still have a roomful of old-fashioned work to do, but our current application suite is diverse enough to keep people excited," Browne said. "Most of our application folks get assigned to projects for anywhere from six months to two years; they pick up new skills on that project, then move on and pick up other skills."

> **"You have to find out what they want and customize a reward system and work situation that best fits their needs."**
>
> *–Wetherbe*

1992 CIO SOFTWARE SURVEY

Attracting and Retaining Staff

Respondents rated the importance of various factors in attracting and retaining valuable development and maintenance professionals

JOB FACTOR	VERY IMPORTANT	IMPORTANT	NOT IMPORTANT
Opportunity to work with leading-edge technologies	64%	30%	6%
Opportunity to work on critical, high-profile projects	62	36	2
Enthusiasm for the mission of the business	57	33	10
Performance-linked compensation	57	32	11
Strong supervision and leadership by IS management	54	37	9
Working in a state-of-the-art development environment	52	38	10
Poorly performing employees are weeded out and dismissed	49	36	15
High salaries	48	47	5
Working in self-directed, empowered teams	48	35	17
Good physical environment	48	35	17
Training	44	46	10
Dual (management/technical) career tracks	43	38	19
Opportunity for promotion into management	36	56	8
Flexible working conditions	35	52	13
Working in an interdepartmental environment	31	58	11
Opportunity to advance career by moving outside of IS	18	50	32

Number of respondents: 98

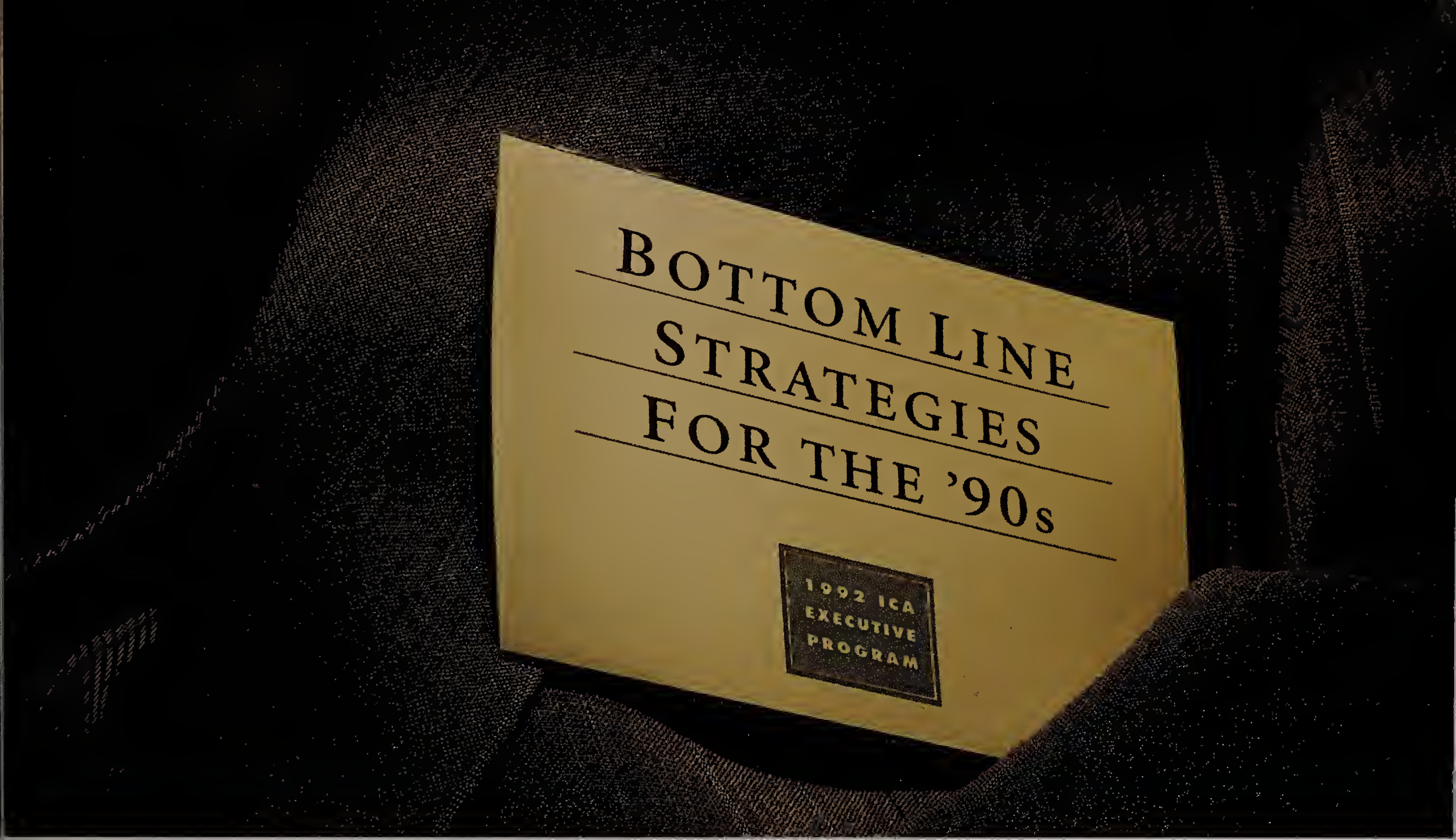
Some CIOs designate rotating support gurus, Wetherbe said. These experts act as virtual team members, moving among various development teams and providing instruction as needed.

No matter what you do, there will always be recalcitrant old-skills people who won't get with the program, but attrition generally will take care of them. "There is a small, dyed-in-the-wool group who say they're going to do mainframe work till they drop dead," Smallman said. "That's OK. It'll be a long time till we don't need any people of that sort."

Establishing a challenging environment should go a long way toward making employees happy, but there's more. Flexible working hours, travel, visibility, opportunities to lead and responsibility are a few of the incentives IS executives can offer employees. "You have to find out what they want and customize a reward system and work situation that best fits their needs," Wetherbe said.

The human element remains the most basic yet also the most crucial piece in the puzzle; without it, nothing else can fall into place. "You can have an advantage momentarily with technology, but your competitors will copy that in six months," said Zawacki. "Those who can better motivate and manage human resources will have the strategic competitive advantage in the '90s."

Kathleen Melymuka is a freelance writer based in Duxbury, Mass.



IT MAY BE THE DIFFERENCE BETWEEN STAYING IN THE DARK AND STAYING IN THE BLACK.

"Bottom Line Strategies for the '90s," the ICA 1992 Executive Program, will shed light on technologies that make a difference where it counts.

BUSINESS UNIT SUCCESS THROUGH TELECOMMUNICATIONS STRATEGIES

Cosponsored by *CIO* magazine and designed for VP- and CIO-level information technology officers, this executive development program will help you manage strategic business units with greater efficiency by introducing you to advanced communications products and services. Informative case studies, presented by senior information officers, will assist you in identifying success strategies. You'll hear how your peers have implemented effective telecommunications programs which resulted in a positive impact on the bottom line of business units.

INTERACTIVE FORUM FOR SOLVING CRITICAL BUSINESS PROBLEMS

"Bottom Line Strategies for the '90s" is a highly interactive forum. Questions will be encouraged and you will find ample opportunity for in-depth discussions during the formal program, at the breaks, and social functions. The insights you gain will prove invaluable--both personally and professionally.

PLATFORM FOR PROFESSIONAL AND PERSONAL SUCCESS

The ICA Executive Program, held in conjunction with the 45th ICA Conference and Expo, is open to all information technology executives. As a part of the Executive Program, participants will tour the Expo and view the products and solutions discussed during the seminar.

Plan now to attend "Bottom Line Strategies for the '90s." For more information, call toll free: 1-800-422-4636. Because with so much potential for profit, why stay in the dark?

1992 ICA
EXECUTIVE
PROGRAM

DATES: *May 18 – Registration/Reception/Dinner; May 19 – Program; May 20 – Tour of ICA Expo.* PLACE: *Hyatt Regency, Atlanta, Georgia.* COST: *Free to ICA member company executives; $250 for nonmember company executives.*

Inner Resources

Cost-conscious IS organizations looking for effective technology trainers are discovering that there's no place like home

BY RUTH COLVIN CLARK

IS departments that are not using internal staff to provide classroom training may be overlooking a valuable resource. Unfortunately, not everyone with technical expertise makes an effective trainer; the highly skilled programmer and analyst is more often than not poorly equipped for teaching assignments. IS staff can function as a cost-effective instructional resource, but turning techies into teachers takes training and support.

Few IS managers would assign a major software-design project to a neophyte analyst without providing training and supervision. Yet many assume that a neophyte instructor can teach with little or no such assistance. Observations of IS classrooms reveal that inexperienced technical trainers tend to equate teaching with talking; rely on theory or product knowledge rather than practical application; leave content holes in their presentations; show little enthusiasm; provide insufficient opportunity for practice; present information in an illogical sequence; and fail to encourage student participation.

Fortunately, IS managers can create an effective technical-trainer support program for a relatively small investment. Such a program should emphasize three areas: recruitment, development of training materials, and platform-skills training.

The first challenge is attracting internal candidates who have the potential to become good instructors yet may feel hesitant about teaching. One way to overcome their reluctance is to make the training assignment part-time or temporary. Because most IS professionals enjoy the challenge provided by their work and fear becoming outdated, many IS departments achieve the best results using staff instructors who continue to perform their technical duties. This solution also allows more technical staff to try on a role that facilitates the development of interpersonal skills important for future management positions.

Recruiting good technical instructors requires some incentives. If extra pay is not feasible, other rewards or recognition are needed. Technical professionals will generally find appealing anything that enhances their expertise. For example, some IS departments give their technical instructors first shot at software or hardware that has just been purchased or is being evaluated. Providing exceptional opportunities for advanced training and attendance at conferences is another popular carrot. Other options include considering instructors first for especially interesting assignments and giving them the opportunity to serve on technical-review or -evaluation teams.

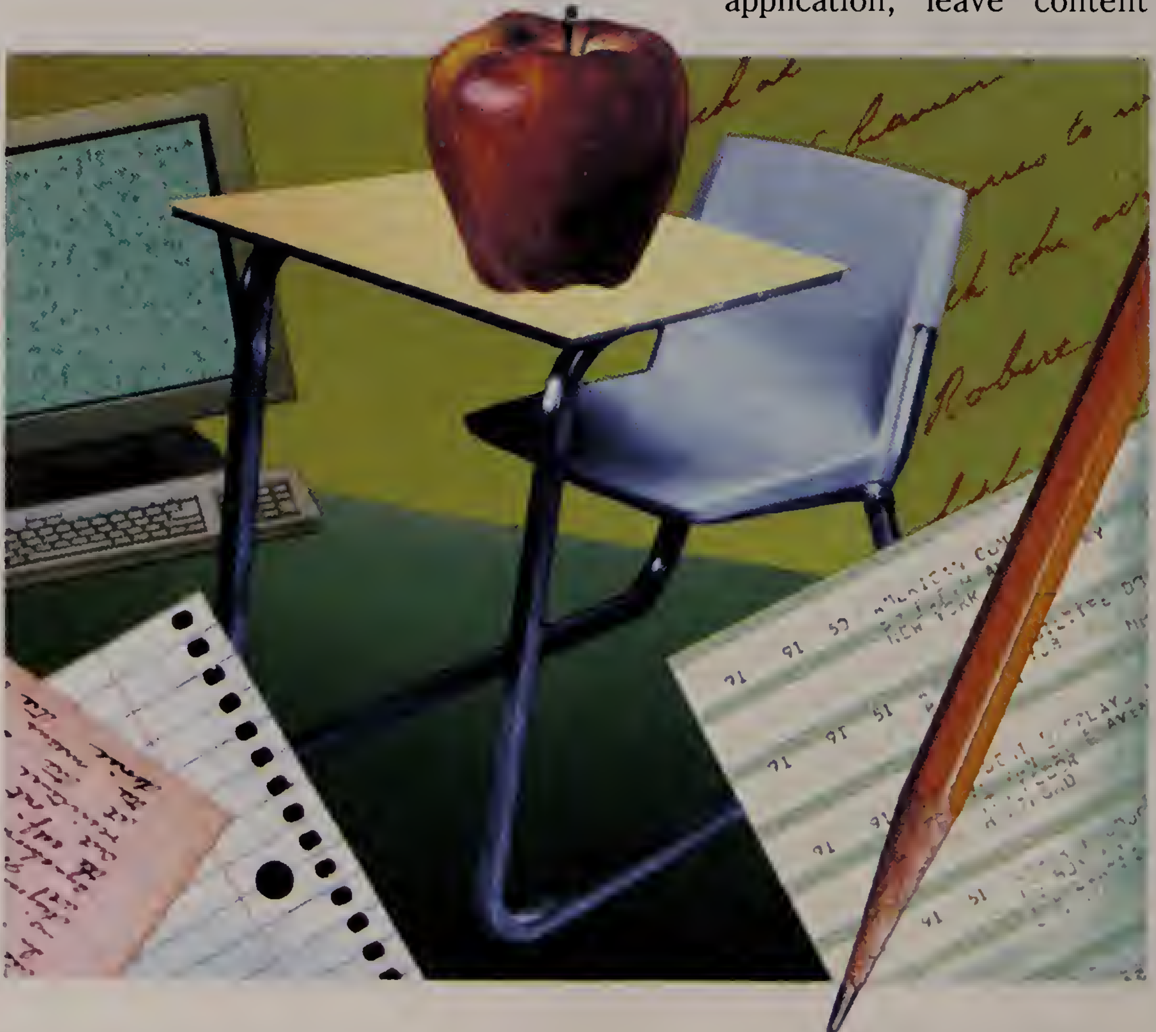
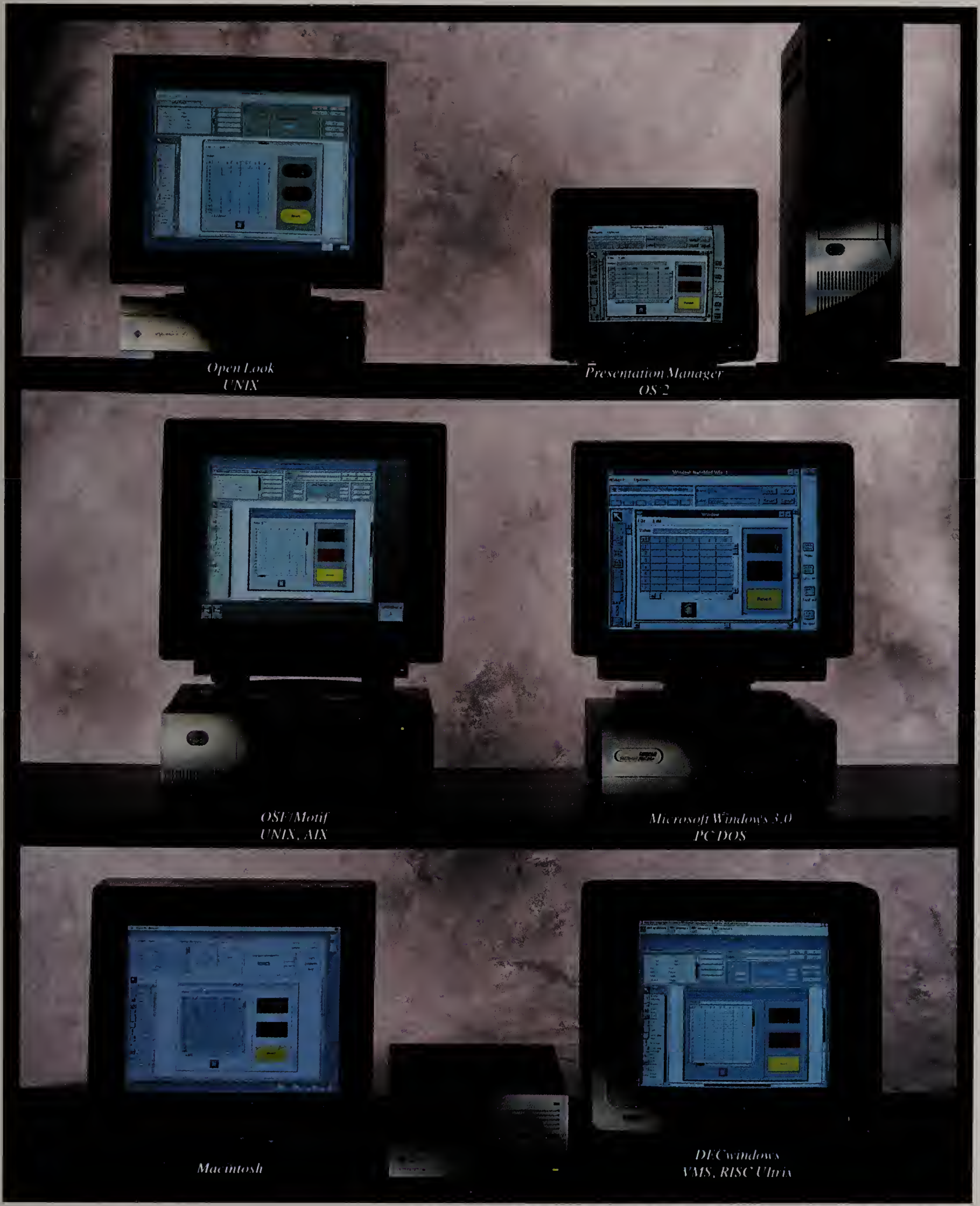


ILLUSTRATION BY VICTORIA KANN

OPEN INTERFACE



PORTABLE GRAPHICAL
USER INTERFACES
ACROSS ALL WINDOWING
STANDARDS

Neuron Data *Open Interface*™ is an object-oriented, C based, extensible development tool with a layered API and graphic editor that lets you create your user interface once, and have it work across all standard windowing environments. Your applications will support native look and feel across OSF/Motif, Open Look, Presentation Manager, Microsoft Windows and the Macintosh. All without changing a line of code.

NEURON DATA

Call today and ask for seminar information. You will also receive product literature and a free comprehensive technical paper.
1-800-876-4900 #486 NEURON DATA, 156 University Avenue,
Palo Alto, CA 94301 415-321-4488

IS managers should also keep in mind that when the instructor role becomes an avenue to promotion, it is perceived as an opportunity rather than a burden. Aspiring IS professionals will not be blind to the fact that many team leaders and project managers were once instructors, having built strong interpersonal and planning skills in the classroom.

It is important to remember that the most expert programmer may not be the best trainer. Those in high demand to handle technical challenges often lack time and energy to prepare and deliver effective training. And a prima-donna attitude, if such exists, may not lend itself to the supportive atmosphere needed in the classroom. Managers should consider, instead, more junior staff who can still remember what it was like to be a learner. Friendly persuasion combined with incentives and support is usually all it takes to recruit good candidates.

In addition to rounding up promising recruits, IS managers will need to implement a formal training-development effort that focuses on the skills and knowledge trainers need to do their jobs effectively. Part of the task may include the development of course materials, sometimes by the instructors themselves. Fortunately, experience shows that IS professionals make excellent course designers and developers.

What skills are needed for course development? Effective course design begins with task analysis: a systematic evaluation of the subject being taught and of the students' backgrounds and prior knowledge. Lessons are subsequently built on the basis of existing skills and knowledge requirements. Learning objectives must also be established in order to spell out the observable behaviors that trainees should exhibit at the end of a lesson or course. Preparation of training materials and evaluation of results are based on these objectives.

Formal evaluation of instructional materials and student progress is not unlike software testing. The data gleaned from pilot training sessions is used to refine instructional materials. Once the materials are validated, test data can be used to evaluate individual learner progress. Post-training performance should also be evaluated to ensure that skills are being transferred to the job.

Since extensive note-taking is inefficient, developers should try to include at least 80 percent of information to be covered directly in the course materials. For many IS applications, reference-based training is a cost-effective alternative to the full-blown instructional document. In reference-based training, students rely primarily on product documentation, which is developed with the training function in mind. Then, an adjunct training manual is built to support the reference document: It should be relatively short and include introductory information and hands-on exercises. Reference-based training ultimately proves more efficient than developing reference and training materials independently.

> *When the instructor role becomes an avenue to promotion, it is perceived as an opportunity rather than a burden.*

Course-development skills are quickly acquired by IS professionals, who are already used to systematic analysis and design efforts. Training in course development and documentation of reference materials is also available from specialists in many major cities. And many large corporations offer internal course-development training, usually through the human-resources department. In addition, a research-based reference methodology for designing training and documentation is offered by Information Mapping, a training and consulting firm in Waltham, Mass.

Once the training materials are prepared, the instructor must get ready to deliver the course. This "platform" part of the assignment can be the most demanding; the skills needed are often quite different from those in normal analyst and programming work. Classroom instruction requires effective presentation skills—and that's only the beginning.

For training to work, instructors must involve learners in the process, through provocative questions, class discussion, practice assignments (both written and hands-on) and an ongoing evaluation of student progress—all the while keeping the class on schedule. Any program designed to train the trainer should include courses in presentation techniques, questioning skills, facilitation techniques, time management and assertiveness training.

Good teaching is more than good talking. Asking questions is one of the best ways to keep students' attention and involve them in the learning process. New instructors should practice generating and delivering different kinds of questions, including some without pat answers. Handling incorrect answers and student questions are also key skills.

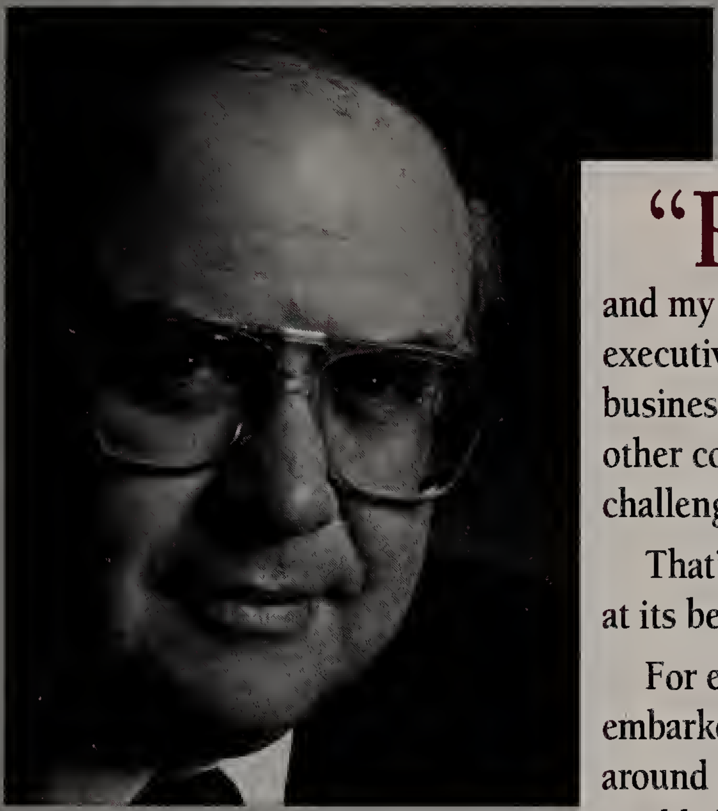
One of the toughest challenges for new trainers is pacing the course. Neophyte instructors often present information too rapidly for students to absorb, or get bogged down in endless discussion or irrelevant side issues. Teaching new trainers to track and assertively manage course timing should be a part of any program.

One way to help new trainers address these issues is by videotaping their classes. The opportunity to review their own performance, in conjunction with expert coaching, is perhaps the most direct feedback the new instructor can get.

IS skills training is critical to keeping technical staff up-to-date in this rapidly evolving, knowledge-based profession. Faced with the need to provide quality training while keeping down costs, IS managers are finding that the solution is right in their own backyard.

Ruth Colvin Clark is principal of Clark Training Consulting in Phoenix, which provides training in course development and delivery.

"I can't place enough emphasis on the value of peer interaction – it consistently makes a difference in the way I solve business problems."



Sid Diamond
Vice President of Worldwide
Information Services
Black & Decker Corporation

"Peer networking has been vital to me and my company. By interacting with other IS executives, I get a personal sense of strategic business issues and learn first hand how other companies approach the same kind of challenges I face.

That's why I joined SIM—for networking at its best.

For example, when Black & Decker embarked on a Total Quality Initiative, I called around the SIM network to find a colleague at a world-class company who was further along on the learning curve. I found an invaluable source who willingly hosted my team for a day and shared his company's experiences. Thanks to his candor we saved significant time and money that probably would have been spent working with consultants. Later on, we were able to return the favor by helping his company when they needed to improve their order processing system. With SIM, it's easy to develop peer-to-peer rapport among professional colleagues.

SIM offers an array of networking opportunities – like conferences, chapter meetings, and one-on-one contact – and I like to take advantage of them all. In my experience, SIM provides the best networking in the IS industry – both for me and for Black & Decker."

BUSINESS BENEFITS FROM THE BEST

The Society for Information Management

- Bringing together information systems executives from leading companies around the world
- Advancing the use and impact of information technologies to achieve business objectives
- Fostering meaningful peer relationships
- Engaging members on a local level through 30 active chapters
- Recognizing excellence with the *Partners in Leadership Award*, the most highly acclaimed award in the industry
- Educating members through local, national and international conferences, roundtables, publications and special reports
- Supporting research to further the information systems profession
- Advancing the IS industry perspective to business, government and society

SIM
International

Interaction, Information, Innovation

For membership information, please contact:

SIM Headquarters
401 N. Michigan Avenue,
Chicago, Illinois 60610-4267
312.644.6610

Getting IT Together

Unlike most technology trends, interoperability is being driven not by vendors but by users who need to reduce costs and increase the value of their products and services

BY MELVYN E. BERGSTEIN, RODERICK S. WALKER AND TIMOTHY McBREEN

Call it interoperability, cooperative computing or distributed processing; by whatever name, it is how business is finally starting to get its computing act together. With or without the help of open systems, organizations of all stripes are building applications that allow the total of their computing investment to return more than the sum of its parts. These organizations—banks, hospitals, manufacturers, service companies and the government—understand that the integrated information environment is the new competitive environment. Eventually it will be the only environment.

Recently, a consumer-products company based in the Midwest developed its own unified marketing system. The new system integrates order processing, delivery, customer service and billing.

When a customer calls in with a problem or to place an order, a telephone switch tells an IBM mainframe to pull the customer's file. The switch then routes the call and the file to the appropriate customer-support person at a PS/2 workstation. If a service call is required, an AS/400 in the support center tells a VAX in the warehouse which parts to dispatch with which service technician. Later, the technician updates the parts inventory and customer file via cellular terminal. To date, the new system has scored impressive results. Average service-response time has been cut by a third. Spare-parts inventory has been reduced 80 percent. And the time needed to process a new order has dropped from seven days to under two minutes.

ILLUSTRATION BY TED PITTS

When it comes to interoperability, many organizations are not waiting around for off-the-shelf technology to arrive. As a result, the computer industry has reached a turning point. It is now the users, not the vendors, who are the true pioneers. They are the ones clearing a path into the next era of computing. And although there is no smooth road yet to interoperability, when one is finally built, those who travel down it will find today's trendsetters ready to greet them at the other end.

The Emerald City

What will the world of interoperability look like? Organizations will be populated by desktop computers that provide personal-productivity solutions to the individual user, who will have transparent access to the major systems running the business. The idea of a computer application will be redefined to mean interchangeable, integrated and cooperating functions distributed across multiple workstations, servers and mainframes. Data will be available where it is needed, and so will the application services that process da-

XEROX

MetLife gave Xerox Printing Systems their stamp of approval.

MetLife's Group Department and Xerox put together a system that yields impressive benefits. It's a system that combines Xerox intelligent laser printers with customized finishers. The new system helped stamp out over $500,000 in costs related to mailings.

Specifically, this system helps MetLife avoid redundant mailings while putting payment documentation and drafts, destined for the same customer, in the same envelope. The system also verifies correct document match, provides an audit trail of payments, and automatically counts the number of pieces mailed.

All told, MetLife's Group Department has used Xerox solutions to avoid spending over $3,000,000 each year on document production. That's $3,000,000 that doesn't get passed along to the customer.

With Xerox printers, you too have the opportunity to produce claim forms, explanation of benefits and checks, provider directories, and much more. Like MetLife, you could be simultaneously producing high-quality documents, faster and for less money, while improving customer service.

Call us at 1-800-TEAM-XRX, ext. 136B. You'll probably find out that our solutions will get your stamp of approval as well.

XEROX
The Document Company

USA
XEROX
OFFICIAL SPONSOR OF USOC.

© 1991 XEROX Corporation. XEROX® is a trademark of XEROX Corporation. 36USC380

ta. Corporate application and data models will be the product of an organization's business requirements, not the by-product of computer-vendor marketing strategies.

Business is not pursuing interoperability because it is technically interesting; the forces driving interoperability are pure economics. Companies need to reduce costs while dramatically increasing value. As organizations become more information-intensive, costs are reduced to the extent that information and computing power are efficiently distributed to the places where they are needed. This is the motivation behind such diverse productivity improvements as just-in-time delivery, bank ATMs and medical-information networks. Just moving an application's interface from the mainframe to PCs can cut mainframe usage by 75 percent. Moving an application entirely to LAN-based PCs can reduce the cost of automating a new department or business to a few dollars, instead of the hundreds of thousands of dollars it might cost to add a minicomputer or mainframe.

Key Producers

But efficiency is only a part of the story (though a very important part, given the pressures pushing down margins in most industries). The other reason that businesses want interoperability is because it allows them to add substantial value to their products and services. This is where interoperability delivers real competitive advantage—by helping the company's big "producers" make money.

Just as the decline of industrial-based production decimated the ranks of middle management, the emergence of knowledge-based production has created new stars—the producers. These are the key individuals who have the most impact on the revenue, profit and wealth of a company. If organizations are information-based, then the means of production are knowledge-based. Successful companies have found that the way to create major value is to hire the people with the most knowledge and give them what they need to be productive—access to information and the tools to use it. The way big producers make money is by applying the knowledge in their heads to information that's in front of them. Historically, however, information is somewhere else—usually locked away in an expensive mainframe.

The successful Wall Street trader is probably the most vivid stereotype of the big producer. But producers can be anyone whose reputation and success deliver a significant market impact—such as design engineers, heart specialists, lawyers, marketers and software engineers. Besides being responsible for making most of the firm's money, these talented individuals have something else in common: Increasingly, they do their work at high-performance workstations. Securities trading, engineering, designing—even complex patient monitoring and diagnosis—are now done on workstations running powerful data-analysis software. In order to have impact, however, producers need two things besides analysis tools: data to analyze, and interaction with the outside world. Both require interoperability.

Successful companies have found that the way to create major value is to hire the people with the most knowledge and give them what they need to be productive—access to information and the tools to use it.

The Need for Richer Data

In order to buy and sell securities, for example, a trader's workstation must be tied to the exchange. But to fully exploit opportunities and maximize profits, traders must know their current positions in different stocks. This means that the trading and stock-analysis applications running on the workstations must be integrated with the mainframe applications that keep track of who owns what stock. Engineers can design cars without their workstations being connected to anything, but it helps if they can pull parts information directly from suppliers' databases. It also helps if product simulation can be performed directly on the computer model in the engineer's design database, delaying the need to build a physical prototype until later in the design cycle. And while doctors can view CAT scans in their offices, they can't complete a diagnosis until they receive a patient's history from medical records.

Increasingly, central data-processing and -storage functions are the cost centers, while transaction and analysis functions are the profit centers of an organization's computing environment. As a rule, customers do not seek out a securities firm for its record keeping, a car company for its parts database, or a hospital for its admissions procedures. Each of these is a support function, of value only to the degree that it helps a trader, engineer, doctor or other producer deliver major benefit to a customer. That is why companies are starting to reorganize their computing (and why a mainframe vendor like IBM is aggressively pursuing the workstation market).

Customer-Driven Technology

The quest for interoperability, then, is really about satisfying two business objectives: achieving operating efficiencies and helping big producers bring in lots of money. The industries that are doing the most to implement interoperability include airlines, insurance companies, food-processing companies and appliance manufacturers. Some are investing millions of dollars in technology to achieve interoperability. The result of these investments will be solutions that go beyond anything the computer vendors themselves are willing or able to provide. But then, technology does not always come from those who are in the business

DIVIDE & CONQUER

DOWNSIZING

RIGHT

Corporate Computing

INTERNATIONAL CONFERENCE & EXPOSITION

April 27-May 1, 1992 ▪ Los Angeles, California

DIVIDE

Downsizing/Rightsizing means migrating selected mainframe and minicomputer-based business applications to platforms of network-based microcomputers and workstations that operate within a client/server architecture.

CONQUER

Downsizing/Rightsizing means tremendous cost savings, system flexibility, user-friendly interfaces, stronger bonds between business managers and IS organizations, and enhanced productivity – adding up to a *competitive advantage.* The **Downsizing/Rightsizing Conference** is the industry's most comprehensive educational event. It is designed to provide the relevant and objective information you need to profit from the industry's latest technical advances.

Conference tracks:

■ Client/Server Architectures ■ Managerial, Financial, and Organizational Issues ■ Networking and Downsizing Technologies ■ Corporate User Studies ■ Windows Applications ■ Systems Development

Over 50 tutorials led by the industry's most respected experts including:

▪ Lucy Baney ▪ John Barry ▪ Jack Blount ▪ Marcia Blumenthal ▪ Paul Burkett ▪ Christine Comaford ▪ David Connor ▪ Paul Cosgrave ▪ Cheryl Currid ▪ John Dunkle ▪ Frank Dzubeck ▪ Richard Finkelstein ▪ Howard Fosdick ▪ John Gallant ▪ Jerrold Grochow ▪ Lawrence Hambly ▪ Tom Kieffer ▪ Theodore Klein ▪ Dominique Laborde ▪ Robert McDowell ▪ Dennis McEvoy ▪ Ronald Peri ▪ Bill Raduchel ▪ John Sifonis ▪ Ken Wasch ▪ William Zachmann, *and more.*

The **Downsizing/Rightsizing Exposition** will feature the latest tools and technologies you will need to implement Downsizing/Rightsizing in your organization. Some of the companies you can expect to see include: *Andersen Consulting, AT&T, Compaq, Computer Associates International, Cooperative Solutions, Data Access, D. P. Specialists Development, Encore Computers, Hewlett-Packard, IBM, Legent, Marathon Systems, Novell, Prologic, Santa Cruz Operation, Sun Microsystems, Tricord,* and more.

Sponsored by

Boston
University
Corporate
Education
Center

72 Tyng Road
Tyngsboro, MA 01879

COMPUTER ASSOCIATES
Software superior by design.

NETWORK WORLD

DBMS

Cosponsored by

sun microsystems

COMPAQ

Boston Systems Group, Inc.

PC MAGAZINE

CIO

To register, or to receive a detailed brochure, please call
1-800-733-3593, ext. 255.

For information on exhibiting,
call 1-800-733-3593,ext. 294 or ext. 261.

of selling it.

Most of the time, new technology products are introduced by vendors before they are demanded by consumers. The technology itself usually drives these products to market (current examples include laptop computers and gigabyte PC hard drives, enabled by trends in miniaturization and "the silicon pricing curve"). Occasionally, as in the case of interoperability, the process works in reverse. There are today no sleeper interoperability products out there waiting to be discovered—despite the fact that some users have been quietly at work on their own solutions for most of the last decade

In Transition

What, then, is the state of interoperability? Vendors are providing some key building blocks, computer users are building solutions as they go, and open systems do not play a significant role—yet. Off-the-shelf technology exists only at the query or file-transfer level. Certainly, off-the-shelf interoperable solutions for such mission-critical applications as on-line transaction processing do not now exist. Current products can send data from one machine to a screen, file or database on another. Conferencing, E-mail and distributed database products achieve this level of interaction. They are not, however, examples of truly interoperable computing—which is achieved when application data and functions are distributed across different platforms. The functions not only exchange data; they also exchange information about what other functions should do with the data.

To our knowledge, no one has done a survey of how far interoperability has spread through various organizations. It is, however, possible to name one or two companies in almost every industry that have installed a major example of cooperative computing. One reason these applications have been slow to evolve is that they are not well understood. By installing these systems now, the trendsetters receive not only the benefits of cooperative computing itself, but also the benefits gleaned from having experience with the technology. They are learning how to deal with the issues of interoperability—whether from a technical or business-management standpoint—and in the process, they are gaining yet one more edge over competitors.

How to Get There

Four general issues confront companies that want to install cooperative solutions: project management, performance, data and system integrity and user environment.

Companies deal with these issues by bringing up interoperability one piece at a time—a unified marketing system here, an integrated design/manufacturing center there, a health-information system over there. Few companies, if any, have integrated the entire enterprise.

BIG QU

When your customers buy better

EDS helped Apple Computer answer yes.

In the rush to market, how can you beat your competition without compromising product quality? Using a **new application** of information technology, Apple Computer now distributes engineering diagrams to all of its manufacturing sites in seconds, via a global electronic network. EDS helped Apple develop this system using the latest imaging technology.

This **speeds the development** of products by eliminating the possibility of errors caused by out-of-date engineering drawings.

Jackie Streeter, Apple worldwide product configuration manager, says, "If people have the right information

EDS is a registered trademark of Electronic Data Systems Corporation. © 1992 EDS

This step-by-step strategy is key to successful project management; it provides an anchor in what can be a tumultuous sea of change. The purpose of a cooperative-computing effort is, after all, to install or change multiple functions. The only way to know for sure if something works properly is to see if it interacts the way it should with something else. If everything were changing at once, there would be nothing consistent against which to benchmark current development.

Another strategy is to start with a unified master plan of what the entire finished system will look like and the steps the project will go through to get there. That plan should take into account the fact that after the whole project has been finished, you will probably have to go back and make revisions—to reflect the most recent technology and new functional requirements and to fix earlier mistakes.

If this sounds like classic software project-management theory—it is. The major difference is that cooperative-application projects are harder to do, and so they require stricter management. The technical issues of performance, integrity and the user environment make these projects more difficult. The performance of cooperating applications, for example, is difficult to predict, simply because there are more factors that affect performance. Integrity is an issue because machines are constantly exchanging data and processing chores. If something fails, who knows where the data is or what operations are complete?

Then there is the user environment. What will the company's big producers see, feel, hear and touch as they go about their work? Will traders have to pick up a phone whenever they call a client, or will they be able to initiate the call by simply clicking on the telephone icon in the client's account window? Will design and simulation functions operate through a common interface (on a common data set), or will windows clutter the screen? Will text-editing commands work the same when updating a patient chart as when ordering a prescription from the pharmacy?

Many organizations underestimate the sheer amount of work that is needed to achieve interoperability. They believe that cooperative computing is just a continuation of current technology. Others will continue to shrug off the costs of using computers as separate appliances. Both groups are making the same mistake. Once the technical problems of interoperability are solved, those who have given way to their inertia may find that it's too late to catch up.

Melvyn E. Bergstein is vice chairman, Roderick S. Walker is vice president and Timothy McBreen is vice president at TSC, a Chicago-based systems integrator.

ESTION:

products, will they come from you?

at the right time, they can make better-informed decisions, which translate into **better products, sooner**."

Using Macintosh computers, Apple employees worldwide can call up engineering diagrams, which they can enlarge, reduce, rotate, or reconfigure to fit with other components. Last fall, the system helped Apple introduce six new products, simultaneously, and **ahead of schedule**, helping maintain Apple's reputation for setting new standards.

Changes in technology create business opportunities. You can use information technology to develop new products, improve quality and shorten time-to-market. To learn more, contact EDS, the world's leader in applying information technology. Write Barry W. Sullivan, Director of Marketing, EDS, 7171 Forest Lane, C11, Dallas, TX 75230. Or you can call (214) 490-2000.

EDS

TAKE ADVANTAGE OF CHANGE℠

FYI

A Reason to Object

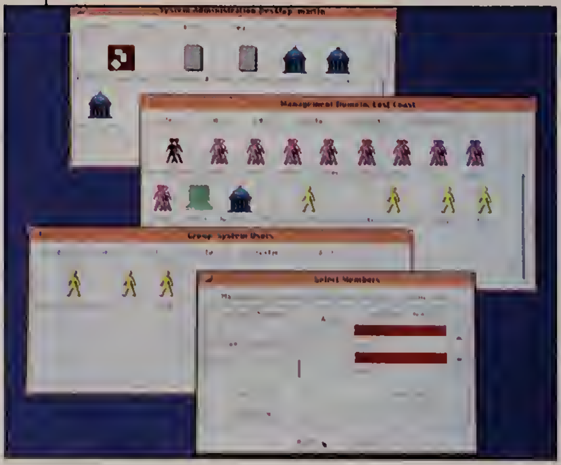
The Frustrated Network Systems Administrator. The title and the modifier have gone hand-in-hand for so long that they seem permanently fused, much like Starving Artist or Beast of Burden. But software vendors are trying to ease that frustration with distributed-systems management tools, the latest of which comes from Tivoli Systems Inc. in Austin, Texas.

Tivoli's WizDOM offering, initially for users of Sun Microsystems Inc.'s Sun 3, Sun SPARC and SPARC-compatible workstations, simplifies network management by representing system elements as objects. With Tivoli's GUI, systems administrators can click and drag these objects around, streamlining both maintenance and security chores.

For example, the administrator can move a user from one workgroup to another or expand the user's network privileges by dragging and dropping an icon from one area of the screen to another. The software also provides automatic, customizable monitoring and notification of system activities.

WizDOM applications include Primary Resource Management for managing users, groups and host computers, and Privilege and Security Management, which gives administrators maximum flexibility in allocating access to network resources.

Standards bodies Unix International Inc. and the Open Software Foundation have given the WizDOM environment their blessing, according to the company. Tivoli can be reached at 512 794-9070.



No More Missing Links

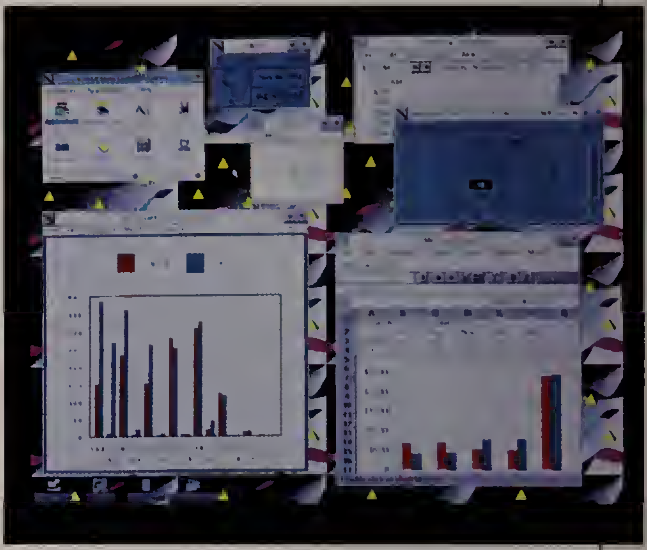
Digital Equipment Corp. wants to help users do Windows. To this end, the company has introduced a set of applications that has nothing to do with squeegees and everything to do with client/server computing.

The TeamLinks family of team-computing software is designed to deliver client/server computing to Microsoft Windows users. According to DEC, the combination of PC-LAN and global-network capabilities will enable TeamLinks users throughout an organization to work together no matter where they are located.

TeamLinks applications include capabilities for communications, information management, administrative workflow, document management, and Microsoft NAS-enhanced and DEC personal-productivity applications.

The flagship package is TeamLinks for PATHWORKS, which is priced at $550 per user. Two subsets are also offered: PATHWORKS Links ($212 per user) and TeamLinks Information Manager ($295 per user). DEC also has available many applications that can be purchased separately.

For more information call 508 493-5111.



Meetings for the Masses

While videoconferencing applications have been technologically possible for some time, price constraints have limited the number actually put into practice to a kind of video elite. Now just about anyone can join the party. Virtual Bridge, by Digital Access Corp., enables dial-up, multiparty videoconferencing without the need for a costly stand-alone controller. It can support any makes or models of video codecs, provided that they are able to communicate with each other or use the international (H.261) video-compression protocol.

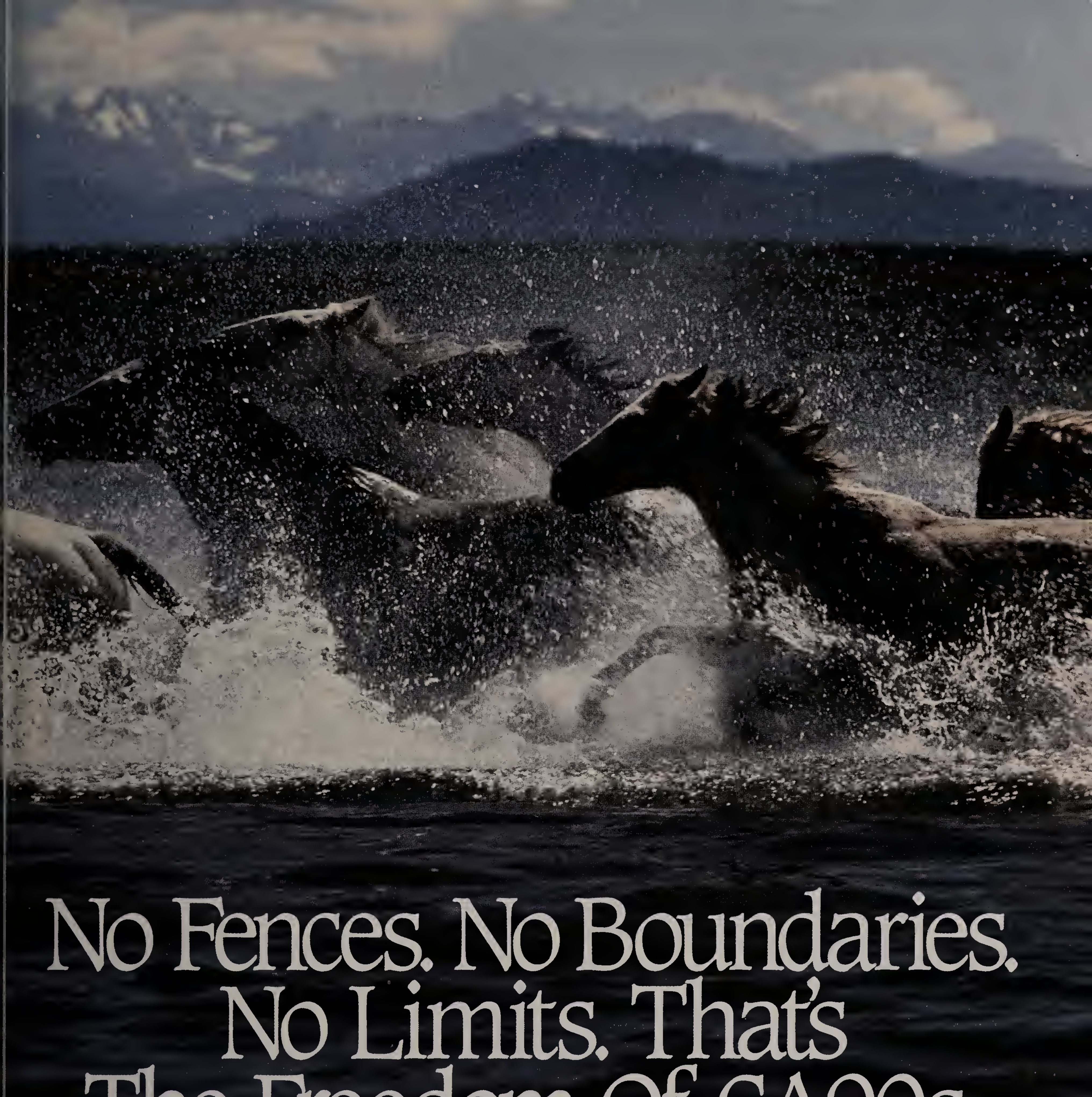
Current bridging technology, according to Digital Access, requires a controller costing between $10,000 and $20,000 per port, for an average cost of $75,000 to $150,000. Virtual Bridge relies on the company's inverse, bandwidth-on-demand multiplexer, Fracdial, and is sold as a Fracdial-installed option for $2,500 per port. Fracdial allows very high-bandwidth traffic (up to full T-1) to be dialed across existing switched digital networks and costs between $6,995 and $11,500, depending on capacity. Call 800 666-2325.

Computer-Aided Aid

It may seem paradoxical, but Bendata Management Systems believes that the best way to help help-desk personnel is by giving them some heat. HEAT (HelpDesk Expert Automation Tool) increases the productivity of help-desk personnel while reducing the paperwork and duplicate data entry common to many help-desks. Intended to improve customer service by automating the desk analyst's workstation, the PC-LAN support system was designed for a multitasking, windowing environment and runs under DOS, Deskview or Windows.

HEAT provides single-key access for quick call logging, call description, problem assignment, journal entry of activities and problem closure. The product's built-in expert system, ExpertAssist, quickly diagnoses and resolves end-user problems using a tree-structured symptom/solution database that may be updated by help-desk personnel during problem logging.

License fees are based on the number of simultaneous users, starting at $2,295 for one. For more information call 719 531-5007.



The freedom to choose the best applications without worrying about hardware constraints.

CA90s

The freedom to right-size your entire computing environment with the best mix of hardware platforms.

And the freedom to integrate and automate all your applications across the many proprietary, closed environments you face today. It's all there inside the most comprehensive architecture ever developed: CA90s.

The only architecture that supports every major hardware platform including IBM, Digital, Hewlett-Packard, Apple, Fujitsu, Bull, Data General, Tandem and Hitachi. All the major operating systems: MVS, VSE, VM, VMS, UNIX, APPLE, WINDOWS, DOS and OS/2.

And the world's broadest range of integrated software solutions, covering systems management, information management and business applications.

If you're tired of being fenced in, call 1-800-645-3003 for complete information on CA90s.

The architecture that can set you free.

COMPUTER® ASSOCIATES
Software superior by design.

© 1991 Computer Associates International, Inc. 711 Stewart Avenue, Garden City, NY 11530-4787. All trade names referenced are trademarks or registered trademarks of their respective companies.

EVENTS

The Business of IT: Finding the Payoff

Loews Coronado Bay, San Diego
March 8-11
CIO Publishing Inc.
800 366-0246 or 508 872-8200

Peter Drucker is the keynote speaker at this conference. Sessions focus on aspects of IT management, technology investments, competitive strategies and corporate business development. In addition, there are organized networking and discussion groups. Registration fees: $950-$1,395.

JAD: Commitment and Quality Through Consensus

Hilton Hotel, San Francisco
April 1 & 2
Digital Consulting Inc.
508 470-3880

The purpose and benefits of a JAD approach to analysis and design is the focus of this conference. Topics include tactics and strategies that facilitate the JAD process. Five case studies with role-playing demonstrate how to plan and conduct group analysis sessions to achieve consensus. Registration fee: $795.

SIM Institutional Member Conference

PGA National Resort, West Palm Beach, Fla.
April 1-3
Society for Information Management
312 644-6610

This conference examines information technology's role in shaping a new business reality. Topics include the changing nature of work, the manager and the worker, changes in communications, transforming the manufacturing floor, quality and global alliances. Registration fees: $1,050-$3,050.

The Comdex/Spring '92 Imaging Showcase

McCormick Place, Chicago
April 6-9
The Interface Group
617 449-6600

This conference offers a picture of imaging and provides ready-to-implement information on emerging technologies and business applications. Over 900 companies exhibit, and keynote speakers discuss technology trends and marketplace issues. Registration fees: $75-$450.

CIO Sales Offices

President and Publisher
JOSEPH L. LEVY
508 935-4601

Director of Marketing
CATHY O'LEARY HAYES
508 935-4521

Inside Sales Rep., List Services
STEPHANIE LEGELIS
508 935-4433

Sales & Marketing Specialist
BRIDGET CAMMARATA
508 935-4035

CIO Publishing Inc.
492 Old Connecticut Path
PO Box 9208
Framingham, MA 01701-9208
508 872-8200, FAX 508 872-0618

NEW ENGLAND

Regional Director/Advertising Sales
LINDA L. BURTON
508 935-4039

CIO Publishing Inc.
492 Old Connecticut Path
PO Box 9208
Framingham, MA 01701-9208
508 872-8200, FAX 508 872-0618

EAST COAST

Regional Director/Advertising Sales
MICHAEL J. MASTERS

Advertising Sales Assistant
PATRICIA GABELMANN

CIO Publishing Inc.
30 Two Bridges Road, Suite 340
Fairfield, NJ 07004
201 227-1140, FAX 201 227-1565

MIDWEST/SOUTH

Regional Director/Advertising Sales
BILL McDONOUGH

Advertising Sales Assistant
CAROL LEE GOCKENBACH

CIO Publishing Inc.
10400 West Higgins Road, Suite 300
Rosemont, IL 60018
708 827-4515, FAX 708 827-9159

WEST COAST

Regional Director/Advertising Sales
GERALD E. PARSONS

Regional Manager/Advertising Sales
RICHARD BASTAS

Advertising Sales Assistant
KIM N. VITO

CIO Publishing Inc.
220 Montgomery Street, Suite 1120
San Francisco, CA 94104
415 398-8200, FAX 415 398-4649

CIO

INDEX

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

AT&T 96
Adaptive Networks Inc. 16
Amdahl Corp. 37, 38, 56
American Cyanamid 16
American Management Systems . . . 56
Amoco Chemical Co. 38
Amoco Corp. 37, 38
Analog Devices 66
Annatek Systems Inc. 56
Apple 16, 32
Bachman Information Systems 56
Bendata Management Systems 92
Blue Cross/Blue Shield 16
Burlington Air Express 46, 74
Channel Computing Inc. 56
Codman & Shurtleff 56
Computer Associates International 56
Cooperative Solutions Inc. 56
Digital Access Corp. 92
Digital Equipment Corp. . . . 16, 38, 56
EDS 16
Easel Corp. 56
First Boston Corp. 56
Foxboro Company 74
GTE Data Services 66
General Motors Corp. 16
Gupta Technologies Inc. 56
Hilton Hotels Corp. 16
Hitachi Data Systems 38
Holy Cross Health Systems 66
HomeView Realty Search Services. 16
IBM 16, 32, 38, 56, 86
Infinity Systems Corp. 56
Information Mapping 82
Intel 32
Intl. Computer Negotiations Inc. . . . 66
International Data Corp. 56
Intersolv Inc. 56
Johnson & Johnson 56
Kansas City Power and Light Co. . 66
Konami 16
Legent Corp. 56
Mars 16
Marzouk & Parry 66
Meta Group 56
Metropolitan Life Insurance Co. 16, 56
Microsoft Corp. 16, 32, 56, 92
Moog Automotive Inc. 56
Morrison Knudsen Corp. 46
Motorola 32
Northern Indiana Public Service Co. 66
Novell 16, 32
Oracle Corp. 56, 96
Pacific Gas & Electric 56
Pan American Life 66
Pearle Vision 46
Periphonics Corp. 16
Powersoft Corp. 56
Revlon 16
Rosenbluth Inc. 16
SAS Institute Inc. 56
Software AG 46
SONAT 46
Sun Microsystems 92
Techsmith Corp. 56
Tivoli Systems Inc. 92
Travelers Insurance Co. 16
W.R. Grace & Co. 46
Wang Laboratories Inc. 56
Witco Corp. 16

Advertiser Index

AT&T C3, 12, 76
AT&T Technologies 48
Apple Computer Inc. 4
BMC Software 40A
Bachman Information Systems Inc. C4
Boole & Babbage 15
Boston University Corporate
Education Center 89
CIO Publishing Inc. 73
Computer Associates Intl. 2, 93
Cylix 69
Digital Equipment Corp. C2, 21
Dow Jones Information Services . . . 35
EDS 90
Early Cloud & Co. 6
IBM Corp. 44
Information Resources Inc. 19
Ingres Corp. 95
International Communications
Association 81
Intersolv 71
Lucas Management Systems 33
Neuron Data 83
Novadyne Computer Systems Inc. . 65
Oracle Corp. 11
Programart 51, 53, 55
RAM Mobile Data 58
Sequoia Systems Inc. 62
Society for Info. Management 85
Software AG 17
Sybase 36
Texas Instruments Inc. 8
Xerox Corp. 87

Editorial, Advertising and Business Offices: 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208–(508) 872-8200. **Postal Information:** CIO (ISSN 0894-9301) is published monthly; and semimonthly in April, May, June, September, October and November by CIO Publishing Inc., 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. Second-class postage paid at Framingham, MA, and at additional mailing offices. **Reprints:** Copyright 1991 by CIO Publishing Inc. All rights reserved. Reproduction of material appearing in CIO is forbidden without written permission. Send all reprint requests to Permissions Editor, CIO, 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. **Photocopy Rights:** Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CIO for users through the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970. Please specify· ISSN 0894-9301. Perrmission to photocopy does not extend to contributed articles followed by this symbol: ‡. **Microfilm:** CIO issues and articles can be purchased on 16mm and 35mm microfilm and on 105mm microfiche through University Microfilms International, Serials Acquisitions Department, 300 N. Zeeb Road, Ann Arbor, Michigan 48106. **Subscriptions:** Address subscription inquiries to CIO, 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208 or call (800) 788-4605. CIO is distributed free of charge to qualified top information executives. To all others, the one-year basic rate for the U.S. and Canada is $94. For rates to other countries, please write the publisher. The single copy price is $7. All subscriptions payable in U.S. funds only. Please allow four to six weeks for new subscriptions to begin. **Change of Address:** Please allow four to six weeks for change of address to take effect. **Postmaster:** Send change of address to CIO, P.O. Box 489, Northbrook, Illinois 60065-9816.

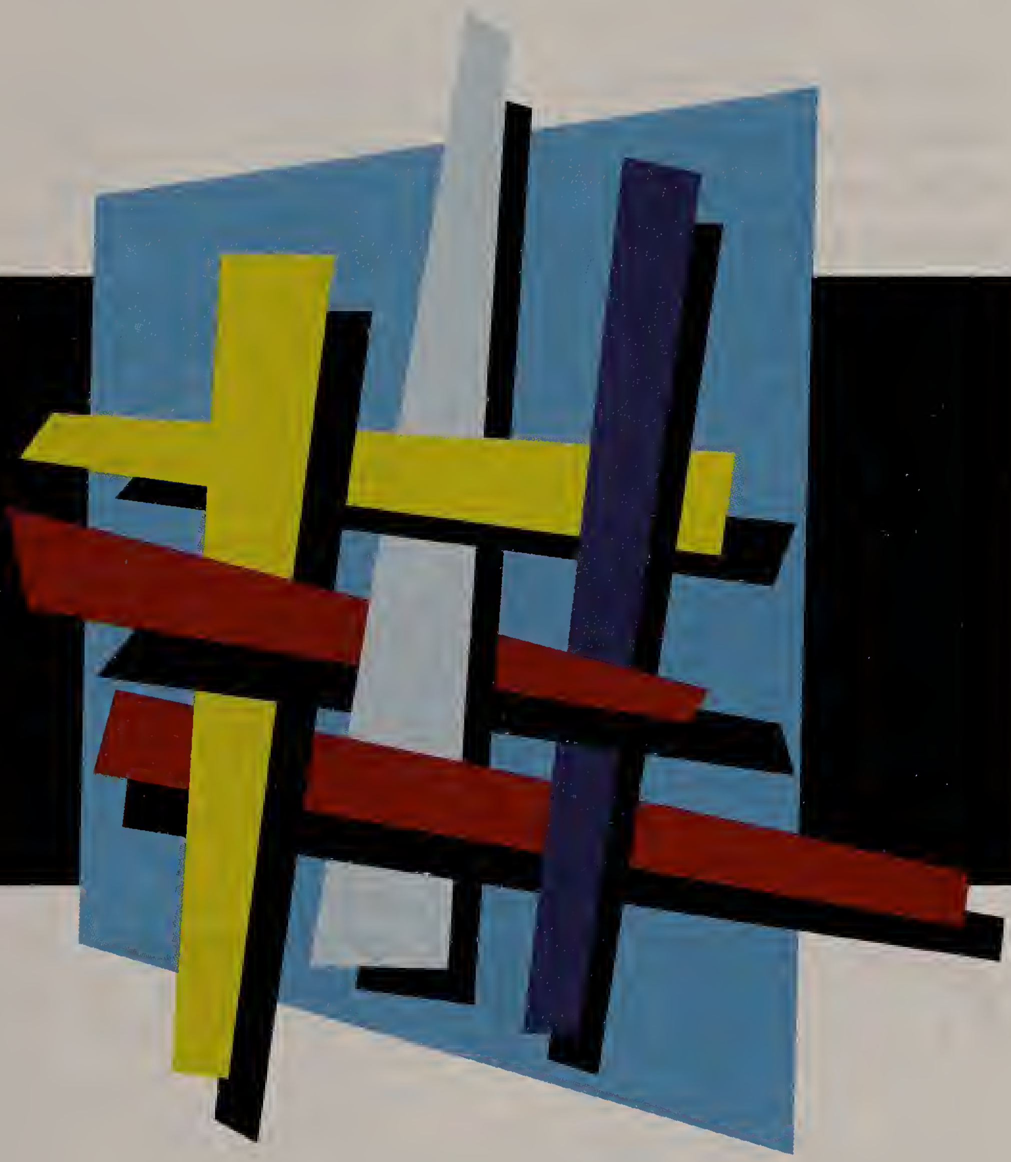
Why can't things sit
still for once?
There's always another
database to include.
Or another
hardware platform.
Or another network.
No matter.

Ingres can show you how production applications can integrate other databases, networks, and platforms. With no new code.

Honest, not a line.
By the way,
no other relational
database company can
do this for you.
Just Ingres. Period.
Want the details?
(800) 4-INGRES

©1992, Ingres Corporation. An ASK Company.

Ingres



Computer-Aided Crime Prevention

The Minneapolis Police Department is getting extra value from its computer-aided dispatch system by using the details of 911 calls to identify recurring problems and take corrective action before trouble strikes

When the Minneapolis Police Department receives a 911 call, squad cars respond as quickly as possible. But not all calls merit immediate attention, and police could be more effectively deployed if they could identify potential callers and take steps to alleviate problems in advance. To this end, the department formed a unit called Repeat Call Addressing Policing (RECAP) in 1987. Central to the unit's operation is a database program that uses data gleaned from the city's computer-aided dispatch system to identify patterns in emergency calls and solve the problems that underlie them.

In Minneapolis, all 911 calls—for police, fire or ambulance assistance—are fielded at an emergency communications center. The details of the calls are stored on an AT&T minicomputer running an Oracle database. Using a custom-built program, the police strip out the 400,000 calls a year directed solely at them, feed the information into a stand-alone PC via tape transfer, and examine the data in a number of ways. "The goal," said RECAP Officer Dave Rumpza, "is to eliminate 1 percent of the calls and reduce the number of [unnecessary] squad-car responses."

For example, RECAP officers discovered that 10 percent of the addresses in the city accounted for 60 percent of the calls for police intervention. Working with the landlords of those buildings, RECAP officers sought ways to solve community problems. In one instance, 75 of the 105 calls made from one building during a short period involved a single apartment. RECAP helped the woman in that apartment get into an alcohol treatment program—and averted future calls.

Both the police and civilians can request a search of RECAP's database (the group receives 6,000 to 7,000 requests a year). The system is updated weekly and contains information on all addresses to which police have been summoned since 1985. Documented evidence of police activity makes a compelling case for corrective action—hard data is used to close problem bars and revoke or deny municipal licenses.

The database has also enabled the public to help lighten the load of the criminal justice system. Previously, in shoplifting cases involving thefts of under $200, the police had to go to the store, write a citation for a court appearance, and then let the suspect go. There was no system for detecting repeat offenders, so one suspect might end up with four or five separate court dates.

After RECAP discovered that eight stores accounted for an average 25,000 shoplifting calls annually, the police authorized those stores' security forces to identify suspects and to forward reports to the police, who then search the system for previous offenses and issue either a citation or a warrant for arrest. This not only saves officers' time; it has freed the court of about 15,000 cases a year, according to Rumpza.

Rumpza has hosted other police departments interested in RECAP, including one from Wales. At the moment, tight budgets are preventing the system's expansion to include data from other city departments. Yet Rumpza and his fellow RECAP officers are satisfied. "The number of times [we] have visited certain addresses has declined," he said. "And that's why this unit was started."

–Megan Santosus

VITAL STATISTICS

Organization: *Repeat Call Addressing Policing—a four-member unit in the community-services bureau of the Minneapolis Police Department*

Application: *A 911 database program*

Scope: *Used by RECAP officers who conduct search requests and analyze data on behalf of police and civilians*

Sponsors: *The mayor, chief of police and city council of Minneapolis*

Technologies: *A customized stripper program that pulls data from an AT&T minicomputer with an Oracle database; a stand-alone Compaq 386S with a 180MB hard drive, and an Epson 2500 printer*

Objective: *To help the police anticipate certain 911 calls, thereby reducing the number of calls and unnecessary squad-car responses to certain addresses*

Payoff: *Enables the police to respond proactively in some situations and has empowered the public to take more responsibility by helping the police*

Design your own network and save 5 - 40%.

For more information on *AT&T Software Defined Network International* or *AT&T Global Software Defined Network*, please fill out and mail this Business Reply Card or call:

1 800 448-8600, Ext. 111.

☐ Yes, I would like to know more about *AT&T Software Defined Network International.*

☐ Yes, I would like to know more about *AT&T Global Software Defined Network.*

☐ I currently use network ____________________.

☐ Please send me information about other AT&T International Business Services.

Name ____________________

Title ____________________

Company Name ____________________

Company Address ____________________

____

City ____________________ State __________ Zip __________

Please be sure to include your business telephone number here:

Telephone: (______) ____________________

AT&T

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 86 CHESTER, NJ

AT&T
P.O. Box 721
Chester, NJ 07930-0721

© 1992 AT&T

Design your own network.

(And save 5-40%.)

With AT&T you can design your own virtual private network that offers the performance and flexibility of a private network, but without the cost and commitment of dedicated lines–and with the advantages of AT&T's worldwide service.

So if your domestic and international phone bills start adding up to $10,000 a month or more, AT&T may have a solution for you.

SDNI ***Software Defined Network International*** adds international reach to 189 locations and countries beyond your U.S. network. If you call foreign company sites, SDNI offers remarkable economy, with convenient dialing and routing options.

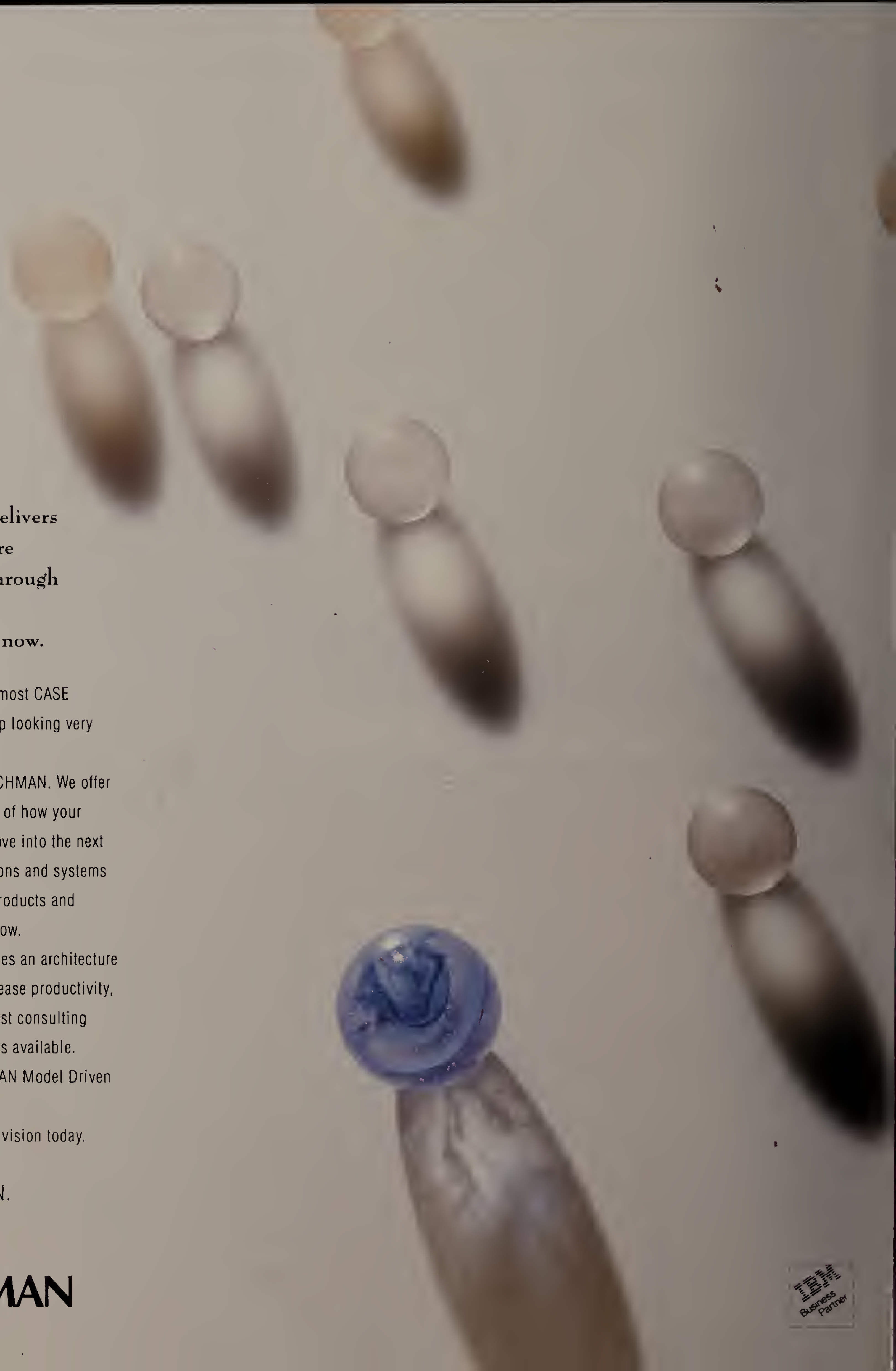
GSDN ***Global Software Defined Network*** creates a virtual private network between your U.S. site and your international site. GSDN handles both inbound and outbound international calls to selected countries, and is the service of choice if you spend as little as 2 hours per day calling a given international location.

Both services offer such features as unified billing of your U.S. charges, flexible network usage reports, centralized work centers for domestic maintenance and installation, and AT&T's tradition of customer service. And both of them can save you anywhere from 5-40%.

Ask your AT&T representative about SDNI and GSDN or call us at **1 800 448-8600, Ext. 111.** We'll be glad to explain it all and explain how AT&T can help you design a virtual network to almost anyplace you want to call internationally at significant savings.

A World of Help℠ from AT&T.

AT&T



All CASE vendors offer product. Only one offers the BACHMAN vision.

BACHMAN delivers proven software productivity through Model Driven Development™ now.

When you examine most CASE vendors, they end up looking very much alike.

All except for BACHMAN. We offer you a unique vision of how your organization can move into the next century of applications and systems development with products and services available now.

BACHMAN provides an architecture to dramatically increase productivity, supported by the best consulting and training services available.

Discover BACHMAN Model Driven Development.™
Start sharing in the vision today.

1-800-BACHMAN.

BACHMAN

IBM Business Partner